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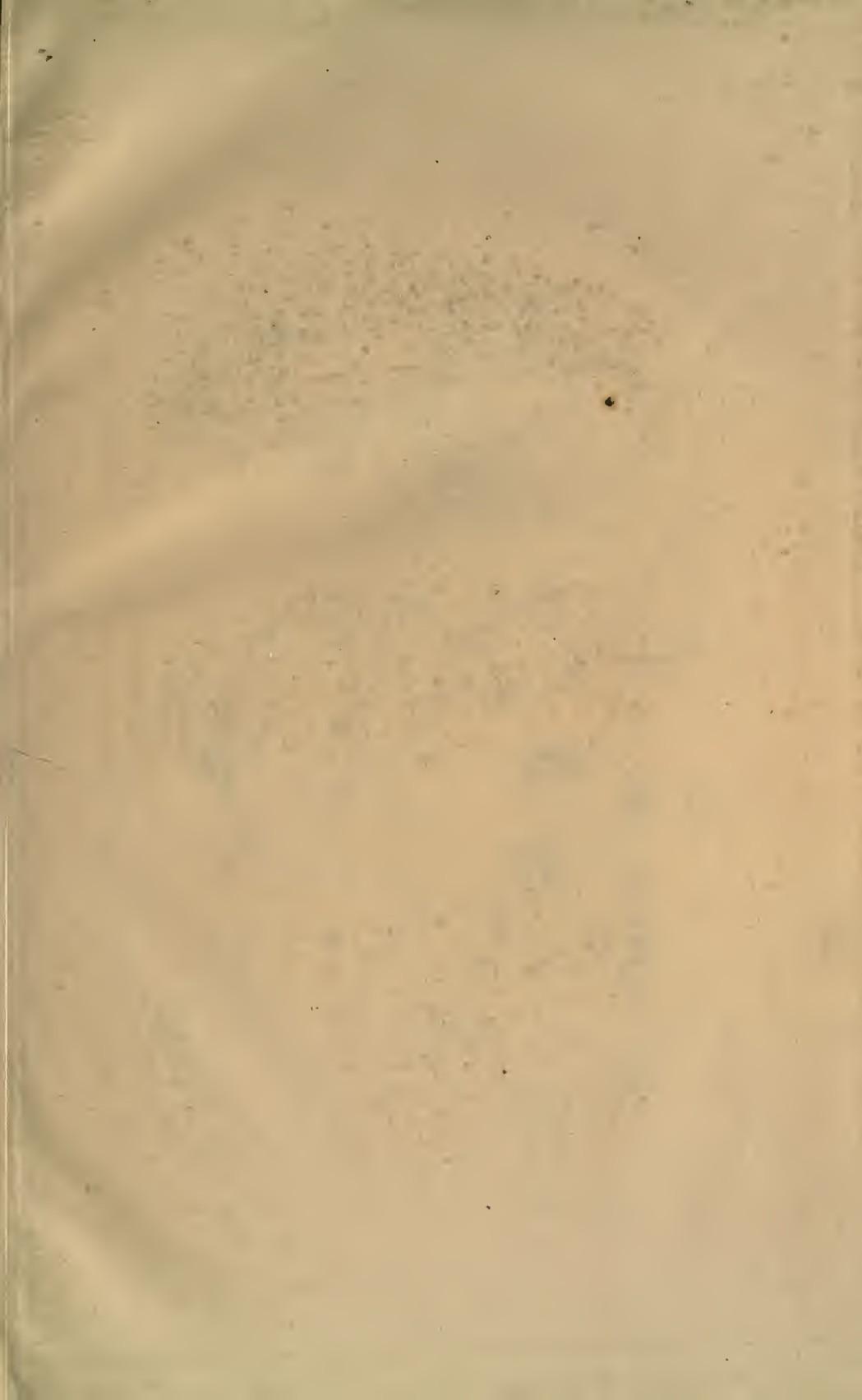
# ACUPRESSURE

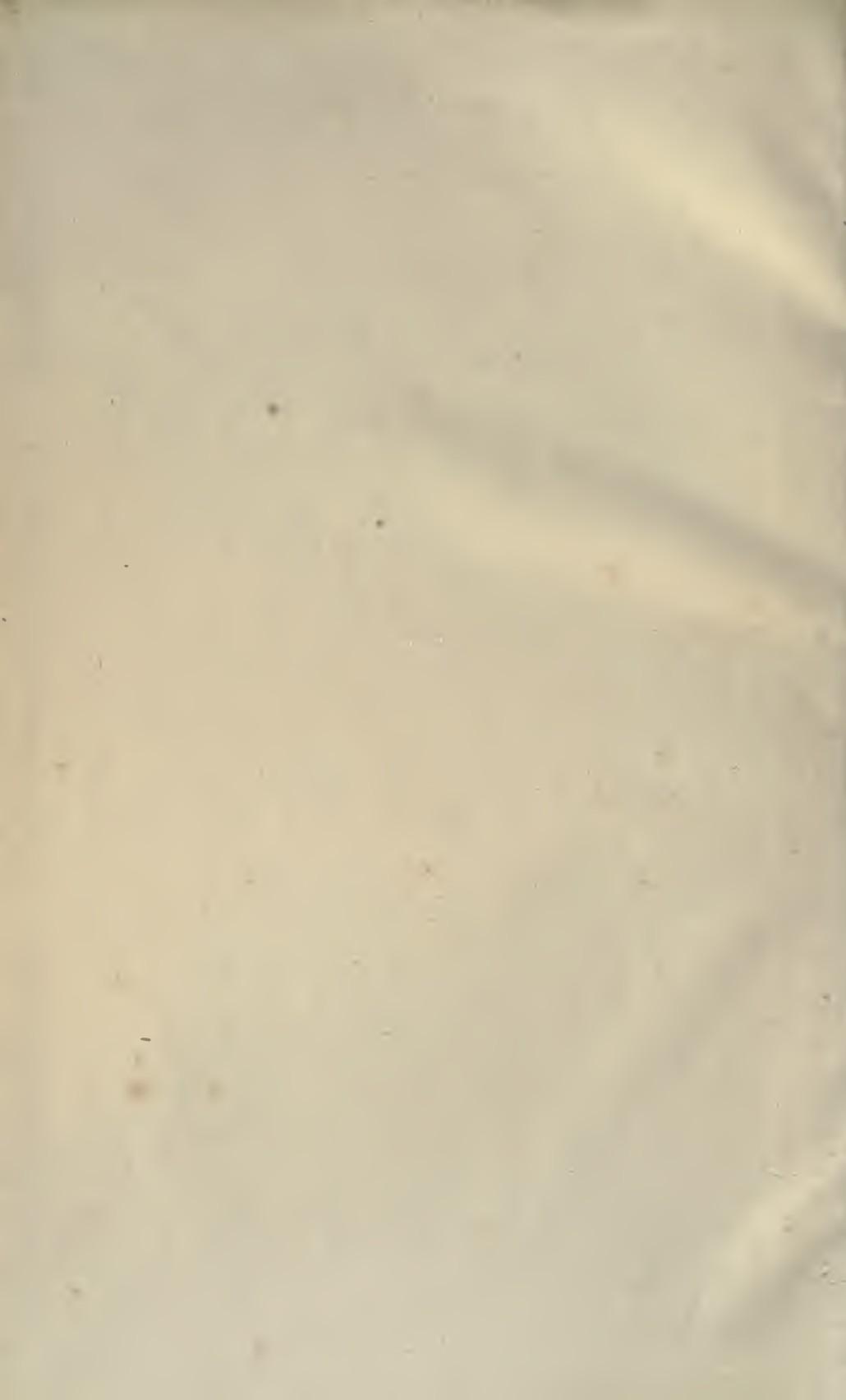
BY

PIRRIE AND KEITH.



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LONDON, W.C. -





A PRACTICAL TREATISE  
ON  
ACUPRESSURE.

BY  
WILLIAM PIRRIE, F.R.S.E.



*John Mackenzie  
Surgeon General's Hospital  
Bombay July 1867*

## ACUPRESSURE:

AN EXCELLENT METHOD OF

### ARRESTING SURGICAL HÆMORRHAGE AND OF ACCELERATING THE HEALING OF WOUNDS.

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TO

JAMES PAGET, F.R.S.,

WHOSE INVALUABLE WRITINGS HAVE SO SUCCESSFULLY PROMOTED

SOUND PATHOLOGY AND SCIENTIFIC SURGERY,

WE DEDICATE THIS PUBLICATION,

WITH THE GREATEST ADMIRATION, GRATITUDE, AND RESPECT.

WILLIAM PIRRIE.

WILLIAM KEITH.



## P R E F A C E.

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HAVING been urged to reprint for separate publication my papers on Acupressure which appeared in the "*Medical Times*" of July, 1865, I now do so in a greatly enlarged, and, I trust, more useful form.

Many additional cases are given, some of which are of considerable interest, and seem to me to show that Acupressure, after certain injuries and operations, is an admirable method of arresting hæmorrhage and of accelerating the healing of wounds.

I have endeavoured to give a brief history of the origin and progress of Acupressure—to enumerate and represent the instruments employed in the proceeding—to describe and delineate the seven methods of Acupressure presently in use—to enumerate the five modes of healing open incised wounds, that it

may be more clearly perceived in what circumstances, and for what modes of healing, Acupressure has advantages over the ligature—to report cases of a diversified character in which I have practised Acupressure—and, to state the appreciation I have formed of this method of arresting haemorrhage.

I owe acknowledgments to my friend, Professor Sir James Y. Simpson, Baronet, for the use of one of the woodcuts illustrative of the First method of Acupressure. The whole of the other illustrations have been taken anew from nature by Mr. Macdonald of Aberdeen. To Mr. Bagg of London I am also indebted, for the admirable manner in which he has made the drawings on wood.

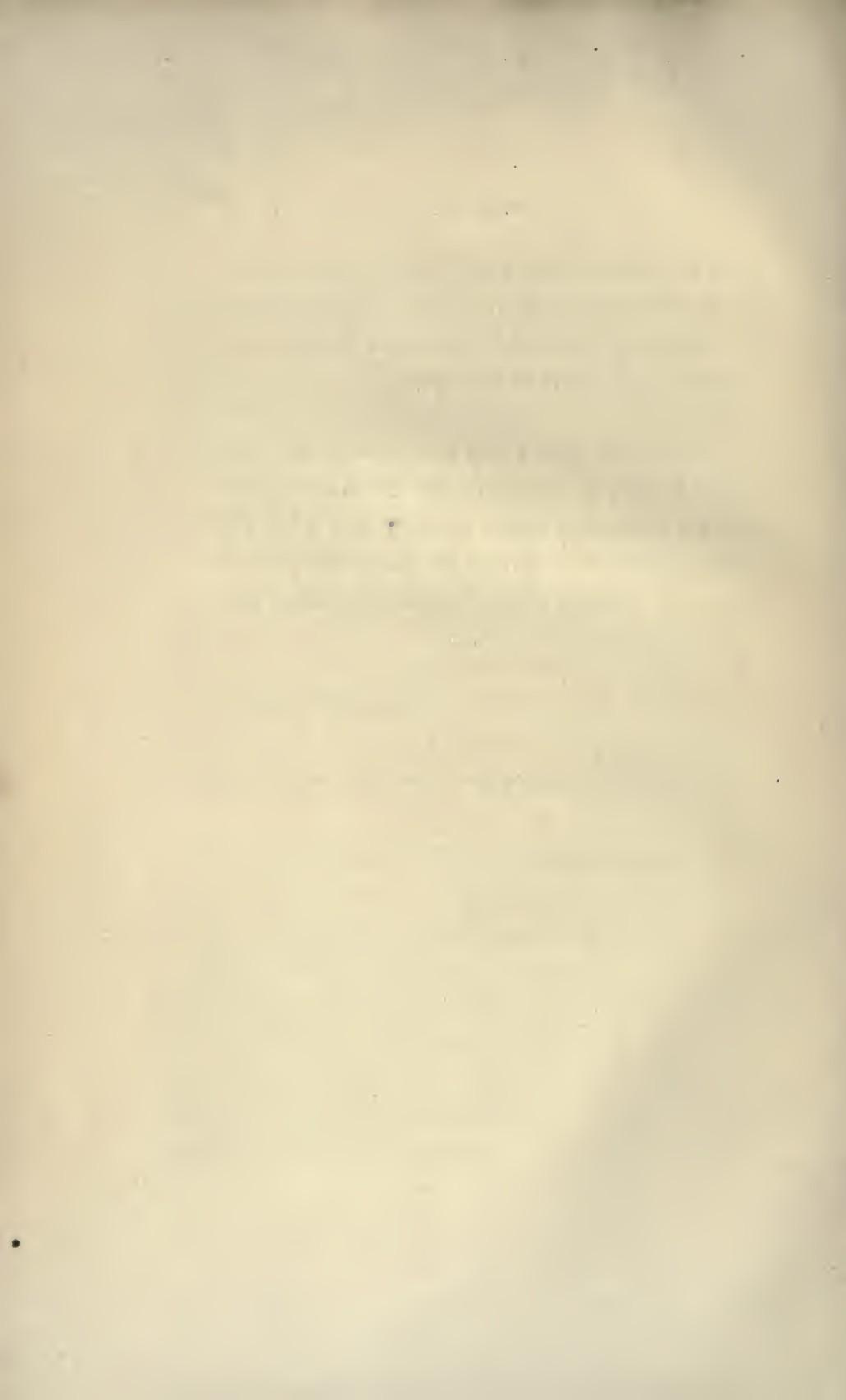
Notwithstanding the progress Acupressure already has made, it has not as yet met with that appreciation to which, in my opinion, it is justly entitled ; and my confident belief is that it would be adopted by many Surgeons, provided they had opportunities of seeing it successfully practised by others. As such opportunities are not conveniently accessible to many, it seems desirable to publish full descriptions and accurate delineations of all the methods presently in use. This I

have endeavoured to do ; and, should Surgeons resolve to practise Acupressure, it would be gratifying if the following descriptions and delineations should in any degree facilitate their proceedings.

However far short I may have come in the object I had in view in publishing this Treatise, my labour will not be lost if it induce others to give a fair trial to a practice which, in my opinion, is an excellent method of arresting surgical hæmorrhage and of accelerating the healing of wounds.

WILLIAM PIRRIE.

253, UNION STREET,  
ABERDEEN, 20th January, 1867.



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## ACUPRESSURE.

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### ORIGIN AND PROGRESS OF ACUPRESSURE.

A NEW method of arresting haemorrhage from cut arteries, founded on the principle of temporary metallic compression, called the method by acupressure, was suggested by Professor Sir James Y. Simpson, Bart., and first described by him to the Royal Society of Edinburgh, in December, 1859. It is useful to read the original descriptions of important discoveries ; and I have perused with much interest the abstract of the above original communication on acupressure, contained in the *Proceedings of the Royal Society of Edinburgh*, vol. iv., p. 249, and the somewhat fuller account given in the *Edinburgh Medical Journal* of January, 1860 ; also Professor Sir James Y. Simpson's communication to the London *Medical Times* of February 11, 1860, giving the histories of the earliest amputations in which acupressure was used for arresting haemorrhage. To those who wish to be thoroughly acquainted with the history, progress, advantages, and three of the principal methods of this

new proceeding in practical Surgery, the perusal of the above-mentioned papers, of four original lectures on acupressure, by Professor Sir James Y. Simpson, contained in the numbers of the *Medical Times* for January, 1864, and of his instructive work on the same subject, published in Edinburgh in the end of 1864, will afford all the information that can be desired. Both in the lectures and in the work, three of the principal methods of acupressure are so clearly described and so distinctly illustrated, that any Surgeon wishing to practise them can have no difficulty in knowing how to do so. The whole subject has been treated so fully that further argument in its favour seems unnecessary ; but although such has been the case—although acupressure has been practised by some Surgeons in these islands, on the Continent, in Asia, Africa, Australia, and by so many in America that the American demand for the passive iron wire used in the proceeding, and for sutures, has stimulated its manufacture in England to a remarkable degree ; and although the progress of acupressure in the time that has elapsed since it was proposed by Professor Sir James Y. Simpson as a means of arresting Surgical haemorrhage has been greater than that of the ligature in the same length of time, after its application by Ambrose Paré to arrest haemorrhage in amputations, still it has not as yet met with general adoption. The period seems now to have arrived when it is

desirable that those who have tried this haemostatic agent should put their cases on record ; and, however inconclusive the observations of a single Surgeon may be, the accumulated experience of many will furnish perfectly reliable statistics, and a just appreciation will be arrived at regarding acupressure.

My Hospital experience of acupressure as a haemostatic agent, in important cases of which records have been kept, comprehends its use in six amputations in the middle-third of the thigh, four amputations of the leg below the knee, one case of amputation of the arm at the upper part of the surgical neck of the humerus, six cases of removal of the mamma, three cases of excision of the elbow-joint, one case of removal of the testicle, and a case of excision of the upper part of the fibula on account of a cartilaginous tumour affecting the head and upper part of bone. I have employed this method of arresting haemorrhage in several major operations in private practice, as well as in many minor ones, which I did not deem sufficiently important to be put on record. Of cases in private practice, I shall, in the present publication, only mention nine—namely, one of amputation above the middle of the thigh, the sixth case in all, in which I have used acupressure in amputation in that region—one of excision of the testicle—two of removal of the mamma—a case of considerable interest in which there was great haemorrhage from a wound in the back part

of the upper half of the forearm, caused by the point of a scythe passing forward between the bones and injuring an artery in the front of the forearm—one of excision of an erectile tumour—one of a wound of the hand attended with violent haemorrhage, where the advantages of acupressure as a haemostatic agent were clearly demonstrated—one of haemorrhage from sloughing of the ball of the thumb—one of a wound of the radial artery—and an interesting case of removal of an epithelial cancer and entire restoration of the lower lip. The thirty-two cases to be afterwards related are of a diversified character, and, therefore, the more reliable for assisting surgeons to arrive at a just appreciation of acupressure. They comprehend seven cases of amputation of thigh; four of amputation of leg; one of amputation of arm; eight of excision of mamma; three of excision of elbow-joint; two of removal of testicle; one of wound of the upper part of fore-arm; one of wound of hand; one of excision of an erectile tumour; one of excision of the upper part of fibula; one of haemorrhage from sloughing of the ball of the thumb; one of a wound of the radial artery; and one of removal of an epithelioma and entire restoration of the lower lip. In every case, both in hospital and private practice, in which I have employed acupressure, its use has been most satisfactory.

Since the publication of some of the above-mentioned cases in my paper on acupressure in the

*Medical Times* of the 1st and 8th of July, 1865, three other Hospital Surgeons have given to the profession the benefit of their experience of this new hæmostatic agent—namely, Dr. Keith of Aberdeen, and Drs. Watson and Gillespie of Edinburgh. Surgeons who have read in the *Medical Times* of the 9th of September, 1865, the valuable paper on acupressure by my able colleague, Dr. Keith, must be fully aware that he has practised this new method of arresting hæmorrhage with great success. I perused that paper with much interest ; and, as it was alike my duty and my pleasure to assist Dr. Keith in all his hospital operations, I had ample opportunities, from personal observation, of forming a correct appreciation of the value of acupressure in his operations. And I have the greatest pleasure in bearing my testimony to the fact that its efficiency and advantages were, in my opinion, clearly demonstrated in Dr. Keith's cases, and faithfully described in his paper. In the latter part of this small work, Dr. Keith has re-published his paper in an enlarged form, and given at the same time, additional cases, and the results of increased experience—all which must materially aid Surgeons in arriving at a correct appreciation of this interesting proceeding in practical surgery

My esteemed colleague, Dr. Fiddes, has employed acupressure at the Aberdeen Hospital in a number of cases with most satisfactory results ; and he has taken

a great interest in all the different methods of this new proceeding. Some of his cases are published along with a few by Dr. Keith and myself in Professor Sir James Y. Simpson's work on acupressure ; but it is earnestly hoped that Dr. Fiddes may be induced to publish all his cases, some of which I know would be found particularly interesting and instructive.

## INSTRUMENTS REQUIRED FOR ACUPRESSURE.

For the practice of the various methods of acupressure to be afterwards described, the only appliances required are :—a pin with a glass head, to admit of sufficient pressure for introduction ; a needle threaded with iron wire ; and a loop of inelastic iron wire, five or six inches in length. For some methods the pin only is required—for some, the threaded needle merely—and, for others, the pin and the loop are required. For the satisfactory practice of acupressure it is necessary to have various sizes of pins and needles ; and I have been in the habit of using the three sizes represented in the accompanying illustrations.

For facilitating introduction of the instruments, and to avoid cutting the tissues, it is important that the pins and needles should be bayonet-pointed ; as they are more easily inserted than the round ones, and not apt to cut the tissues as the spear-pointed have been found to do.

Those who are desirous of using the appliances represented in the accompanying illustrations will have no difficulty in obtaining them from Messrs. Weiss, 62, Strand, London.

FIG. 1.

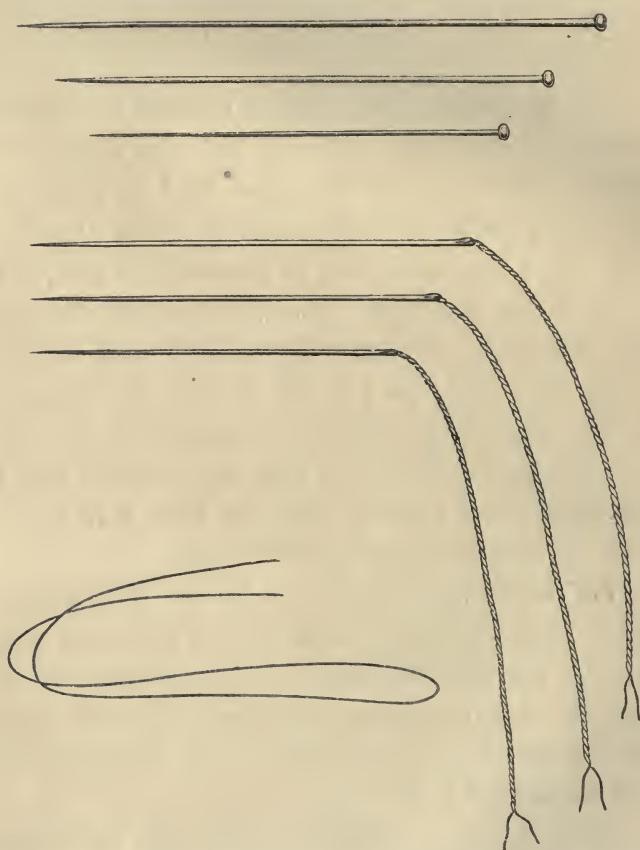


FIG. 1.—Acupressure pins, needles threaded with iron wire, and a loop of inelastic iron wire.

## VARIOUS MODES OF ACUPRESSURE.

An important object, which I am exceedingly desirous of accomplishing, is to make perfectly clear and intelligible the principal methods of acupressure now in use. They are seven in number; and each method will be described—illustrated with diagrams—its rationale explained—and reference made to examples of its adoption in cases in a future part of this publication. It would be exceedingly gratifying if the perusal of this section should be useful in enabling surgeons who may wish to practise the various methods of acupressure to know how to do so.

### FIRST METHOD OF ACUPRESSURE.

THE FIRST METHOD—to use the words of Professor Sir James Y. Simpson, who has kindly favoured me with the use of the accompanying illustration,—“consists in passing a needle through the flaps or sides of the wound, so as to cross over and compress the mouth

FIG. 2.

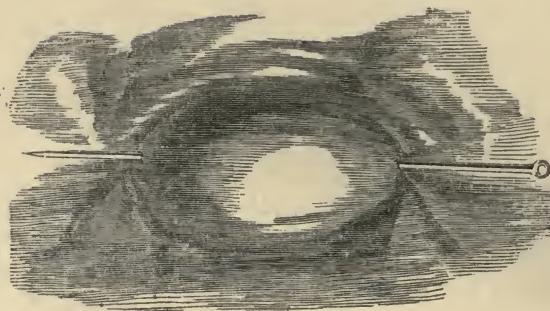


FIG. 2.—Cutaneous surface of a flap, in which an artery is secured by an acupressure pin, according to the first method.

of the bleeding artery or its tube, just in the same way as in fastening a flower in the lapelle of our coat, we cross over and compress the stalk of it with the pin

FIG. 3.

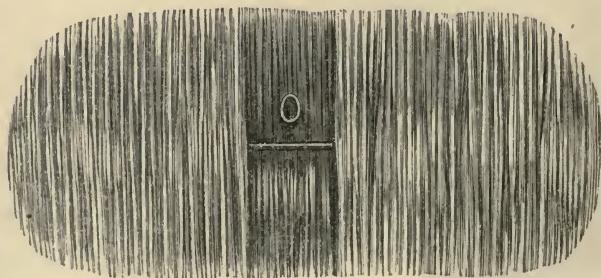


FIG. 3.—Wound surface of the same flap, showing the bridge of the acupressure pin compressing the artery—(*Drawn after Simpson*).

which fixes it, and with this view push the pin twice through the lapelle. The only portion of the needle which is left exposed internally on the fresh surface of the wound is the middle portion of it, which bridges over and compresses the arterial tube at its bleeding mouth, or a line or two or more on the cardiac side of it. And if it were a matter of any moment, this part need not always be left bare ; for the needle could be often passed a few lines higher up, between the vessel and the cut surface, and without emerging on that surface. More or less of both extremities of the needle —viz., its head and point, are exposed externally on the cutaneous surface of the side or flap of the wound. When passing the needle in this method, the Surgeon usually places the point of his left forefinger or of his thumb upon the mouth of the bleeding vessel, and with his right hand introduces the needle from the cutaneous surface, and passes it right through the whole thickness of the flap till its point projects for a couple of lines, or so, from the surface of the wound, a little to the right side of the tube of the vessel. Then, by forcibly inclining the head of the needle towards his right, he brings the projecting portion of its point firmly down upon the site of the vessel, and after seeing that it thus quite shuts the artery, he makes it re-enter the flap as near as possible to the left side of the vessel, and pushes on the needle till its point comes out again at the cutaneous surface. In this

mode we use the cutaneous walls and component substance of the flap as a resisting medium, against which we compress and close the arterial tube. But in some wounds a neighbouring bone or other firm unyielding texture forms the best and readiest point of resistance against which to pin and compress the artery by the acupressure needle."

In many conditions, the first is an admirable method of suppressing hæmorrhage, as is shown in many of the cases to be afterwards related; and in none could its results be more gratifying than in acupressing the spermatic arteries in the cases of excision of the testicle,—the radial and ulnar arteries in the case of Helen M'Grigor, who had violent hæmorrhage from a deep wound of the hand,—a large vessel in the case of excision of an erectile tumour—and the facial arteries in a widow lady, on whom an operation was performed for the removal of a cancer and the entire restoration of the lower lip.

#### SECOND METHOD OF ACUPRESSURE.

THE SECOND METHOD consists in inserting the needle in the fresh surface at a little distance from the vessel, pushing it on, causing its point to rise up as near to the artery as possible, bridging over and com-

pressing it, dipping the point of the needle into the raw surface of the wound on the other side of the vessel, forcing it on, and causing the needle to emerge a second time on the wound. The needle is threaded with a passive iron wire, by which it can be easily withdrawn.

This description, and a glance at the accompanying illustration, will make this method sufficiently intelligible.

FIG. 4.

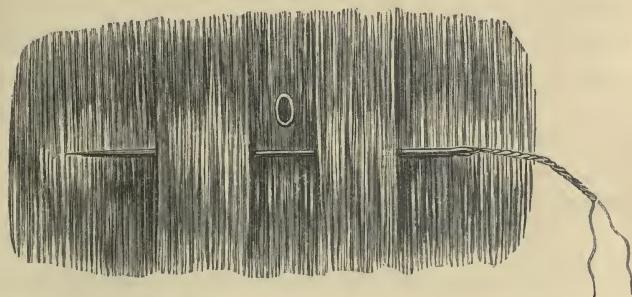


FIG. 4.—Second method, by means of an acupressure needle threaded with iron wire, to admit of its being withdrawn.

gible, and the *rationale* of its operation in checking haemorrhage must be perfectly clear :—the pressure

caused by the needle passed across the track of the artery being sufficient to arrest its circulation. I have never acupressed an important artery in a major operation by this method ; because, although I have often been surprised how little pressure, when direct, is sufficient to stop the circulation through a vessel, there are other methods whose reliability as haemostatic agents is unquestionable, and I have, therefore, thought it judicious to give them the preference. In many minor operations, however, I have practised this method, and always with satisfactory results. Occasionally I have used a pin instead of a threaded needle ; and I invariably do so when the form of the wound and the situation of the artery admit of the head of the pin being easily and conveniently kept without the wound.

#### THIRD METHOD OF ACUPRESSURE.

THE THIRD METHOD consists in entering the needle on one side of the artery, pushing it behind, causing its point to emerge on the opposite side of the vessel, passing a loop of inelastic iron wire over its point, bringing the wire over the track of the artery and behind the stem of the eye-end of the needle, drawing it sufficiently to close the vessel, and fixing it by a twist or half a twist around the needle. The wire

FIG. 5.

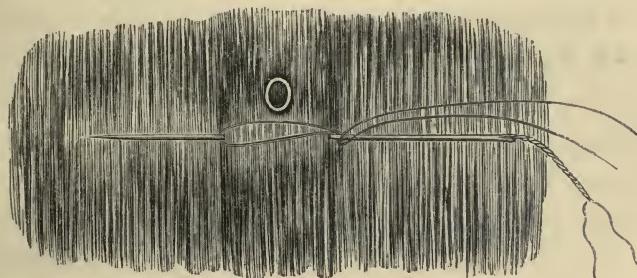


FIG. 5.—The Third method, by means of an acupressure needle threaded with iron wire, and a loop of inelastic iron wire.

with which the needle is threaded should be twisted that it may be readily distinguished. By means of this twisted wire the needle can be pulled out, after which the loop of wire is liberated, and can be easily withdrawn.

Many examples of this method will be found in the various amputations of the thigh, leg, and arm, and also in several excisions of the mamma to be afterwards related in the section containing cases of acupressure.

## FOURTH METHOD OF ACUPRESSURE.

THE FOURTH METHOD, or that by a long pin and a loop of passive iron wire, is a modification of the third, and differs from it only in a long pin, with a glass head, for facilitating its insertion, being substituted for the acupressure needle threaded with iron wire. Perhaps of all methods the Third and Fourth are the

FIG. 6.

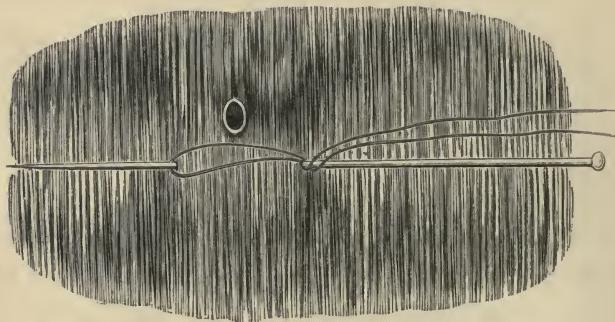


FIG. 6.—The Fourth method of acupressure by means of a long pin and a loop of iron wire.

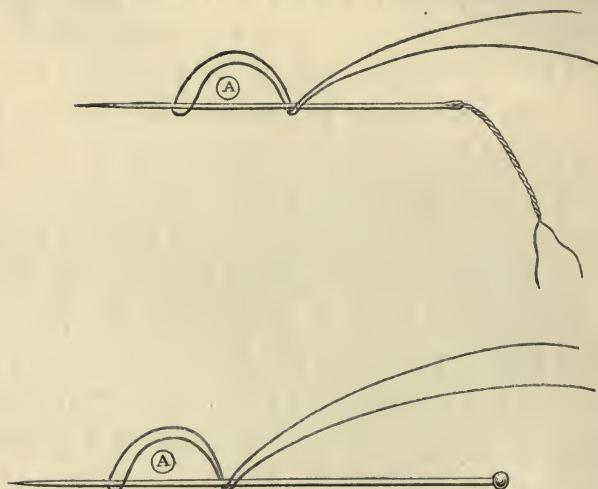
most secure. The principle in each is the same, but I like the modification of using long pins when convenient for the form of the wound, as they can be

so quickly introduced, so readily withdrawn, and all wriggling, kinking, and entanglement of different kinds of wires with each other avoided. Kinking of the wire with which the needle is threaded has sometimes, I am aware, been found to cause difficulty and pain in withdrawing the needle.

The use of the needle being at times attended with some or other of the inconveniences above referred to ; and the employment of the pin having the four following advantages, namely—greater quickness and facility of insertion, greater elegance of proceeding, being more readily and easily withdrawn, and admitting of being twirled before being withdrawn, and its removal thereby greatly facilitated—I have been induced, as a general rule, to prefer the pin to the needle ; or, in other words, to practise the Fourth method rather than the Third, where either is admissible. My two esteemed hospital colleagues, Drs. Keith and Fiddes, also prefer the pin to the needle ; and I am satisfied that all who have experience of both methods will come to do so. The pin, however, cannot always be used ; as some forms of wound and certain positions of a bleeding artery render it impossible to insert the pin in the proper position, and to bring its head out of the wound without straining of tissues ; and in such circumstances the threaded needle, owing to there being less length of unbending material, can be used with great facility. The Third method, therefore, in some situations, has advantages over the Fourth.

Of all methods of acupressure, the Third and the Fourth are, no doubt, the most secure ; and that they are perfectly reliable is satisfactorily proved by the cases of amputation to be afterwards described. The principle on which the haemorrhage is suppressed in both methods is precisely the same.

FIGS. 7 and 8.



FIGS. 7 and 8.—Shewing the mechanism of the Third and Fourth methods of acupressure, namely :—steady, direct compression of the artery between the loop and the needle in the Third method, and between the loop and the pin in the Fourth. The rationale of the operation in both is made clearly intelligible by the two accompanying skeleton diagrams, Figs. 7 and 8.

Fig. 7 is drawn after Simpson, by whom it was devised, as well as the method it is designed to illus-

trate. Professor Sir James Y. Simpson says—"In this scheme, A represents the artery, which, with some surrounding tissue, is intended to be inclosed and compressed between the needle passed below it and the wire passed over it. This diagram also shows the loop of the wire as thrown over the point-end of the needle ; and it represents also that single twist of the wire around the eye-end of the threaded needle which is sufficient to fix and keep it fixed. For it must always be remembered that, in working with wire-thread, a slight twist of it around another piece of wire-thread, or around any fixed body, as a needle, fixes and fastens it in the same way as a tie fixes and fastens a silk thread."

Fig. 8 illustrates in the same way the mechanism of the Fourth method, and differs from it only in a long pin with a glass head being substituted for a needle threaded with iron wire.

#### FIFTH, OR ABERDEEN, METHOD; OR THE METHOD BY THE TWIST.

Of this method there are two varieties ; and they differ from each other only in the extent of rotation given to the instrument by which the twist is effected. In the one variety the instrument is made to undergo a half and in the other a quarter, rotation of a circle. For either method a single instrument only is required, namely, a threaded needle or a long pin.

*First variety of Fifth, or Aberdeen, Method—Half Rotation.*

For facilitating the description of the variety in which the acupressing instrument is made to undergo a half rotation, it may be said to consist of three steps. In the first step, there are three movements given to the needle or the pin, and they are precisely the same as the three first movements of the needle in the Third, and of the pin in the Fourth, method of acupressure : that is, the instrument is entered some lines to one side of the bleeding artery, passed behind it, and then its point made to emerge on the surface of the wound a few lines on the other side of the vessel. The parts at the termination of this stage present the appearance delineated in Fig. 9 if the needle, or in Fig. 10 if the pin, has been used.

FIG. 9.

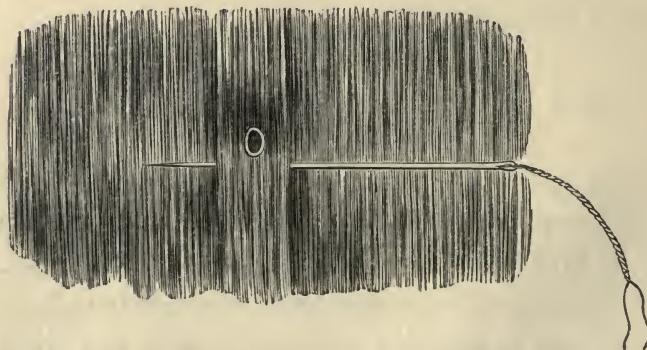


FIG. 9.—Illustration showing the appearance of the parts at the termination of the first step of the Fifth, or Aberdeen, method, with a threaded needle.

FIG. 10.

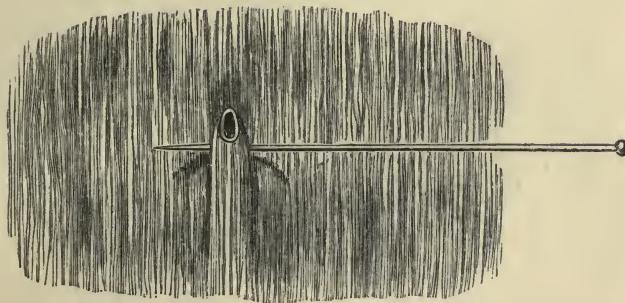


FIG. 10.—Illustration showing the appearance of the parts at the conclusion of the first step of the Fifth, or Aberdeen, method, with a long pin.

The second step consists in twisting the needle or the pin to the extent of half a rotation so as to bring its head to the side where its point was situated before making the twist; the instrument being now above, instead of below, the artery, and well pressed down upon it. The third step consists in sending the point of the instrument into the tissues beyond the artery, for the purpose of securing it in the proper position, and retaining the twist.

The parts will then present the appearance delineated in Fig. 11 or in Fig. 12, according as the needle or the pin has been used.

FIG. 11.

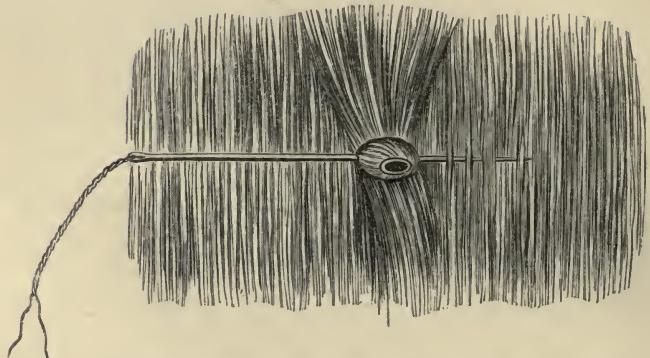


FIG. 11.—Illustration showing the Fifth, or Aberdeen, method, with a threaded needle ; the appearance of the parts after making the half rotation and fixing the needle.

FIG. 12.

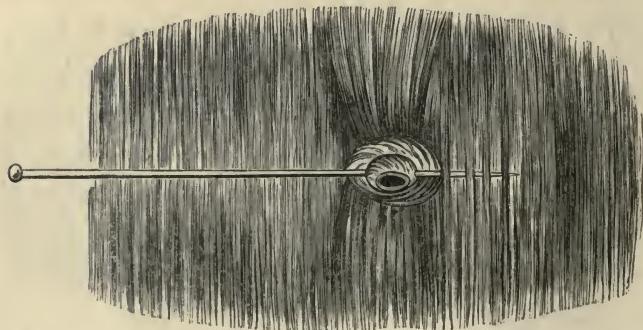


FIG. 12.—Illustration showing the Fifth, or Aberdeen, method, with a long pin ; the appearance of the parts after making the half rotation and fixing the pin.

*Second variety of Fifth, or Aberdeen, Method by the Twist—  
Quarter Rotation.*

This is decidedly the preferable variety ; and presents the peculiarity of a quarter rotation only being given to the instrument used in acupressing the artery. For making clear the description of this variety, it may, like the former, be said to consist of three steps. In the first step, the needle or the pin is inserted on

FIG. 13.

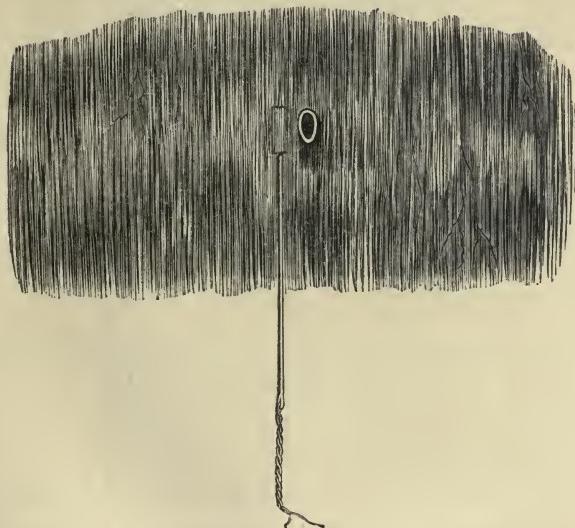


FIG. 13.—Diagram showing the appearance of the parts at the termination of the first step of the Fifth, or Aberdeen, method by the twist before making the quarter rotation with the needle.

one side of the bleeding artery, then pressed onwards a few lines in the same direction as the length of the vessel, and its point caused to emerge on the surface of the wound, as shown in Figs. 13 and 14. In the

FIG. 14.

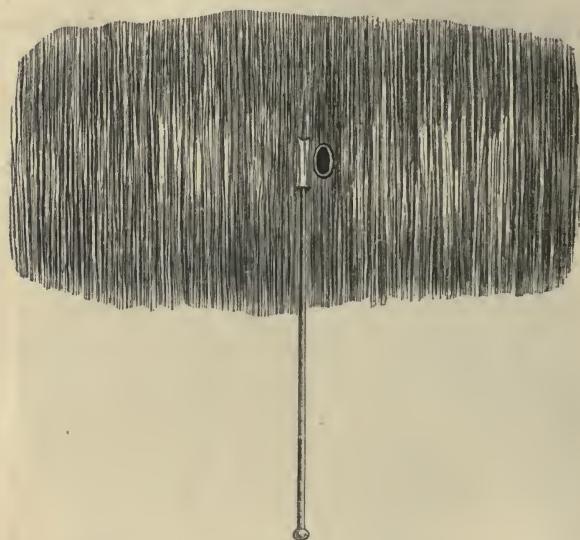


FIG. 14.—Diagram showing the appearance of the parts at the termination of the first step of the fifth, or Aberdeen, method by the twist before making the quarter rotation with the pin.

second step, a quarter rotation is given to the instrument so as to place it above the artery, and well pressed down against the small portion of tissues between the instrument and the vessel. In the third step,

FIG. 15.

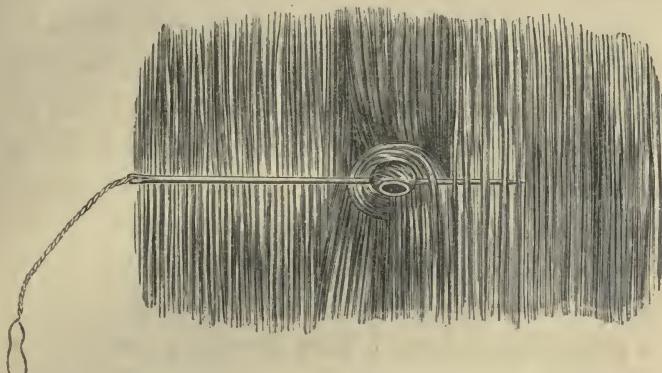


FIG. 15.—Diagram showing the appearance of the parts after the quarter rotation of the needle, and the alternate insertion of the needle-point into the tissues beyond the artery.

FIG. 16.

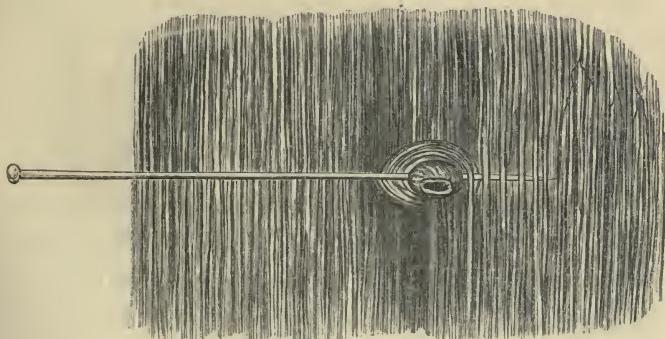


FIG. 16.—Fifth, or Aberdeen, method, with a quarter rotation of the pin. The diagram shows the appearance of the parts after the quarter rotation, and the ultimate insertion of the pin-point in the tissues beyond the artery.

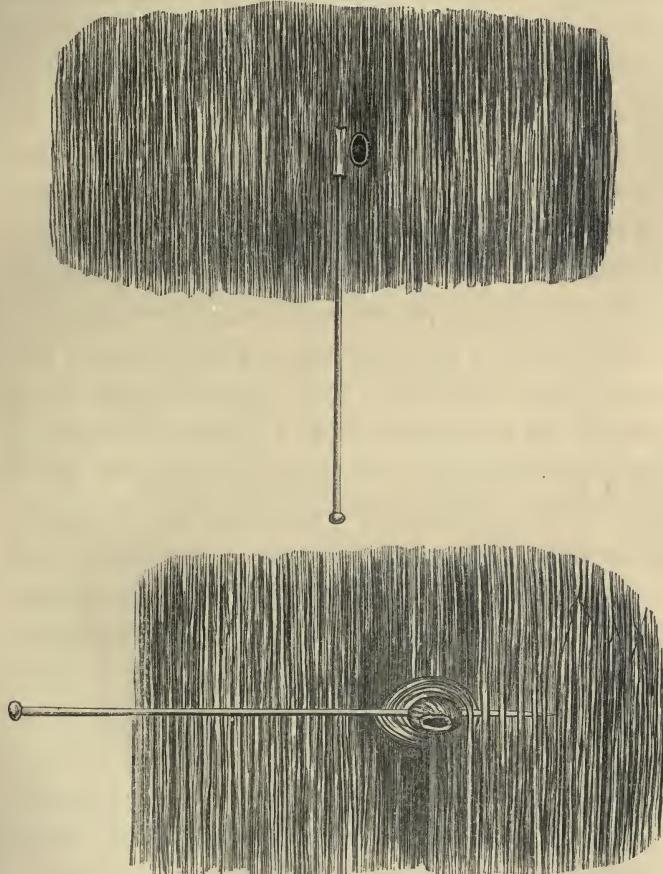
the needle or pin is secured, and the twist retained, by sending the point into the tissues beyond the artery ; when the parts will present the appearance shown in Fig. 15 if the needle, or in Fig. 16 if the pin, has been used for effecting compression. The operator has, on the cessation of bleeding, a reliable proof that a sufficient degree of rotation has been given to the needle. The first time I tried the method by the twist, a half rotation was given to the needle ; but as so little pressure, when direct and steady, is sufficient to arrest hæmorrhage, I have invariably preferred in other cases a quarter rotation. The gentlemen who were present in the theatre of the Hospital at the first operation where I tried acupressure by the twist were particularly struck with the great simplicity of this method, as well as the facility with which it could be employed ; but, as the manœuvre with the small needle could not be distinctly seen from a distance, after the removal of the patient, they were greatly interested in seeing a demonstration I gave of this mode, by using a large pin to compress the mouth of the femoral artery in the amputated limb.

In practising either method by the twist, the part for the first insertion of the needle or pin, may be slightly varied, if necessary for having its head conveniently directed to the edge of the wound when the intended twist has been made.

Of the two methods by the twist, and perhaps of all

the methods of acupressure, that by the twist with a quarter rotation, especially when performed with a long pin, as shown in the two accompanying illustrations,

FIGS. 17 and 18.



FIGS. 17 and 18 appeared in former pages as Figs. 14 and 16, but as they illustrate the best method by the twist they are here inserted together.

is the simplest, the easiest, the quickest, and, so far as experience in the Aberdeen Hospital warrants an opinion, perfectly efficient.

Simplicity, efficiency, quickness, and ease of performance, are unquestionably great recommendations of the variety of the method by the twist when performed with a quarter rotation and a long pin ; but this variety possesses two other advantages, in my opinion, of the greatest importance for obtaining either immediate union, or union by primary adhesion. The one, that there can be but little molecular injury or straining of tissues ; the other, that, by the gentlest twirl and traction, the pin can be easily withdrawn with extremely little, if any, discomfort to the patient. Surgeons who know how little produces pain in an amputation wound, how slight a degree of pain is apt to cause involuntary contraction of muscles in the stump, how certain such contractions are to separate parts of the internal surfaces of the wound from each other, although by retentive means its edges are kept in apposition ; and who, after the greatest anxiety to obtain the best results, have so often in a few days witnessed the disheartening effects of such contractions, will fully appreciate the value of a means of arresting haemorrhage that, at the moment deemed judicious, can be removed, not only without pain, but almost without discomfort to the patient.

In the Fifth, or Aberdeen, method by the twist, of

which examples will be found in the amputation and other cases to be afterwards related, the artery is, to a certain extent, twisted as well as steadily compressed ; and in that way, no doubt, the occlusion of the vessel and the suppression of the haemorrhage are effected.

#### HISTORY.

Professor Sir James Y. Simpson used this method early in the history of acupressure in a case of cancroid tumour of the vulva, operated on by Dr. Handyside, and in a case of amputation by Mr. Edwards ; but he had published no account of it when the same method occurred as a perfectly original idea to the mind of Dr. Knowles, formerly House-Surgeon of the Aberdeen Hospital, and now an Assistant-Surgeon in the Queen's Army. Dr. Knowles suggested this method without the knowledge that it had been devised by Professor Sir James Y. Simpson, and I felt anxious to give it a trial. I did so, with perfect success, in the Aberdeen Hospital on the 29th of June 1864, in a case of amputation of the thigh, to be afterwards described. This was the first instance in which the femoral artery was secured in this way. At the time I had no knowledge, and could have had no knowledge, that this method had ever been tried.

Regarding this method of compressing arteries, Professor Sir James Y. Simpson, in his work on acu-

pressure, published subsequent to the practice of the method by the twist at the Aberdeen Hospital, states :—“This mode of acupressure formed one of the earliest “which I tried in practice, for I employed it in 1860, “in a case where Dr. Handyside removed by the knife “a cancroid tumour of the vulva. The wall of the “wound was perpendicular, and I secured, in the “manner detailed, the principal bleeding vessel ex- “posed upon it. I employed it, also, in a case of “amputation by Mr. Edwards; but, at the time, it “appeared to me that the other methods were prefer- “able. The late experience of the excellent Surgical “Staff at the Aberdeen Hospital, makes me doubt that “opinion.”

All the Surgeons at the Aberdeen Hospital who practise acupressure—namely, Dr. Keith, Dr. Fiddes, and myself—consider the method by the twist an admirable one in many circumstances ; an opinion in which Professor Sir James Y. Simpson now fully agrees. It is earnestly hoped that the united favourable testimony thus borne by my colleagues and myself may induce surgeons of many other hospitals to give this method a fair trial.

It is no part of the Fifth, or Aberdeen, method by the twist to transfix the artery ; on the contrary, great care is taken to avoid doing so. It is important to be aware of this circumstance, that there may be no confusion between this method and one practised by some

surgeons, in which there is transfixion of the artery by the needle and then partial rotation, called the method by transfixion and twist. This method consists, as hitherto tried, in transfixing the tube of the artery, causing the point of the needle to emerge on the surface of the wound, giving a quarter rotation to the needle and fixing its point in the tissues beyond the vessel. The great and distinguishing difference between the Aberdeen method by the twist and that by transfixion and twist is in the first step. The first step of the former consists in transfixing tissues in the proximity of the artery in a manner already described, and of the latter in transfixing the artery itself. The second and third steps of both are precisely the same. I have no experience of this method, of which some have said that it should be called a method of acutransfixion and not of acupressure. I have heard of a case in another part of Scotland where it was tried in amputation of the thigh, and haemorrhage occurred. As other methods are more secure, I would not feel inclined to practise it ; and, for the present at least, it appears to me that it should be entirely excluded from the advisable or reliable modes of acupressure.

## SIXTH METHOD OF ACUPRESSURE.

The Sixth method was devised by Dr. Keith ; and for its performance, in the more elegant way, requires

a long pin and a duplicature of passive iron-wire. The point of the pin is entered a few lines from the artery, then passed below or by the side of it, and afterwards pushed on so that the point emerges a few lines beyond the bleeding mouth of the artery. In this step of the operation two things must be carefully observed—the first, to cause the pin to pass close by the bleeding mouth of the artery, but on no account to transfix it ; the second, to avoid making the point of entrance and the point of exit at any undue distance from each other, so that no unnecessary amount of tissue may be embraced by the wire in the next step of the operation. The duplicature of iron-wire is next thrown over the point of the pin, and the two ends are then crossed behind the stem of the pin so as to embrace the bleeding mouth between them. The ends of the wire are then pulled sufficiently tight to arrest the hæmorrhage, thereafter brought forward by the sides of the pin—one on each side—and finally fixed by a half twist in front of, and close down upon, the pin. An important precaution during this step is to avoid pulling the ends of the wire more than necessary to arrest the hæmorrhage ; otherwise two inconveniences would be apt to result—namely, the risk of molecular injury and diminished vitality of the tissues from too great pressure caused by the wire, and the chance, after withdrawing the pin, of some difficulty in removing the wire, owing to the undue constriction of

the tissues it embraces. The appearance of the parts at the conclusion of this method is accurately delineated in Fig. 19, taken from nature ; and it is hoped that the

FIG. 19.

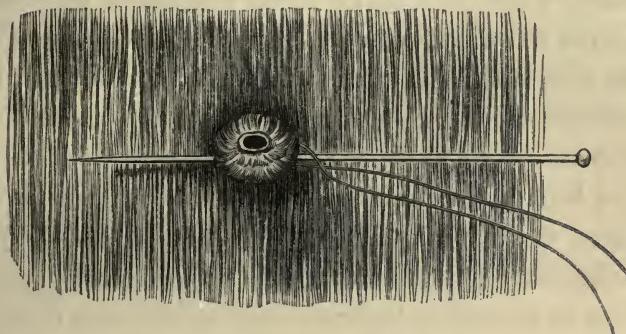


FIG. 19.—Showing the Sixth method, by means of a pin and loop of iron wire.

above description, along with the illustration, will make the proceeding perfectly intelligible. It is impossible, however, from the very nature of the method, to delineate the whole arrangement of the wire in any illustration in which the soft parts are represented, and I therefore designed the skeleton diagram which forms Fig. 20, a single glance at which will give a

FIG. 20.



FIG. 20.—Skeleton diagram, showing the arrangement of the wire in the Sixth method.

F

perfect idea of the mechanism of this method, and the rationale of its operation in checking hæmorrhage. If this method be judiciously performed and the wire not made improperly tight, the occlusion of the bleeding artery is produced by its being compressed between the pin and one side of the loop ; but if the ends of the wire, after being crossed behind the pin, be drawn too tight, the occlusion will be effected on the principle of deligation ; and the rationale of the proceeding will then be precisely the same as in deligation by ligature, where the tenaculum is used instead of the artery forceps—the pin taking the place of the tenaculum—the wire that of the ligature—and the half-twist of the wire the place of the knot of the ligature. For the reasons, however, already stated, the Surgeon should be exceedingly careful not to draw the wire with unnecessary tightness ; and then the occlusion of the vessel will be effected, chiefly at least, by compression between the pin and one side of the loop ; and on removing the pin no difficulty will be experienced in withdrawing the wire. For securing a vessel on a perpendicular wound, the Sixth will sometimes be found a convenient method in circumstances where the performance of the Third or Fourth would be attended with difficulty. This will more particularly be the case in such a form of wound where the artery happens to be cut short, and where, from that circumstance and the nature of the surrounding tissues, it

could not easily, by the aid even of an artery forceps, be brought out so as to admit of its being compressed by the loop, as employed in the Third and Fourth methods. I have several times assisted Dr. Keith in operations where he employed this mode ; and I have twice adopted it in amputation of the great toe, performed according to the method of Malgaigne, and once in securing the anterior tibial artery in amputation of the leg.

## SEVENTH METHOD OF ACUPRESSURE.

The Seventh method consists in passing a long needle through the cutaneous surface, pretty deep into the soft parts, at some distance from the vessel to be acupressed -- making it emerge near the vessel — bridging over and compressing the artery — dipping the needle into the soft parts on the opposite side of the vessel — and bringing out the point of the needle a second time through the common integument. In this method the soft parts are twice transfixed, and the artery is compressed between the bone and the middle portion of the needle in front of the integument, between the first point of exit and the second point of entrance. Three portions of the needle are left without the integument — namely, its central portion and its extremities. Fig. 21 gives a clear illustration of this method, and

FIG. 21.

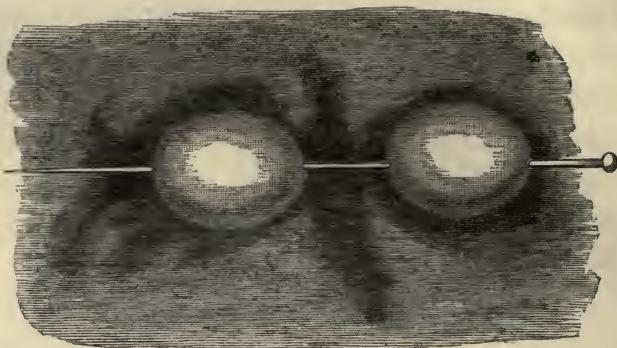


FIG. 21.—Showing the position of the pin in the Seventh method. The middle portion in front of the integument bridges over the artery to be acupressed, and the compression is effected between the middle portion of the pin in front and the bone behind. See case 12 in a future section.

case 12, in a future section, furnishes an example of its employment with the most gratifying results. Subsequent to the previous publication of the above-mentioned case, my colleague, Dr. Fiddes, showed me an excellent example of the Seventh method, in a female, who had previously undergone amputation in the middle third of the thigh, and who, on the evening before I saw her in hospital on this occasion, was affected with smart haemorrhage from old and deep ulcerations in the part of the thigh that formed the stump. The femoral artery was bridged over by a long pin inserted according to the Seventh method—the pressure exerted by the middle portion of the pin

was made greater, than it otherwise would have been, by a small compress of lint being placed between the pin and the integument in front of the artery—and the haemorrhage was effectually suppressed.

Having classified the seven methods of acupressure approved of and used, both in hospital and private practice, by the three surgeons of Aberdeen who practise acupressure, namely :—Dr. Keith, Dr. Fiddes, and myself—and having endeavoured to describe, to illustrate, to state the rationale, and to refer to examples of each method in a future section, I shall now—for the convenience of surgeons who may resolve to practise acupressure, and who may not have seen it practised by others—give together, in their order, the illustrations of the seven methods. These illustrations have already appeared in this section under the head of the method each is intended to illustrate ; but it is thought it may be useful to give the illustrations together, with nothing more than the name of the method and the description of the diagram. I am the more anxious to do so, because I am convinced that the progress of acupressure is greatly retarded by the circumstance that surgeons, who would practise acupressure, have not opportunities of seeing it practised by others. Such opportunities are not conveniently accessible to many surgeons ; and it is therefore the duty of those who have the decided belief that acupressure is preferable to delegation, to afford every facility to their brother-surgeons to enter

upon the more excellent way of suppressing haemorrhage. Owing to excessive occupation of my time, and other causes, I fear I have greatly failed in making this subject so clear and intelligible as could be wished ; but as something in addition to the information that at present exists seemed necessary to remove difficulties in the way of the more general adoption of what I believe to be a valuable proceeding, I trust my fellow-labourers in the field of surgery will look with a kindly eye on what I have done, and that they will not allow my deficiencies to prevent their giving acupressure a fair trial.

#### FIRST METHOD.

FIG. 22.

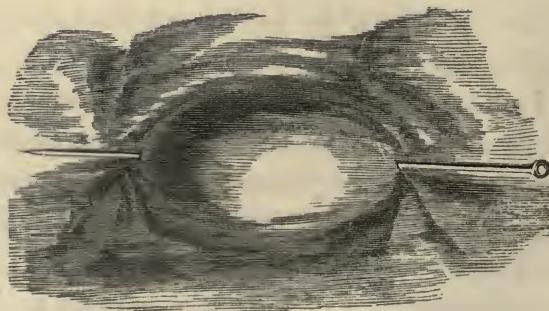


FIG. 22.—Cutaneous surface of a flap, in which an artery is secured by an acupressure pin, according to the First method.

FIG. 23.

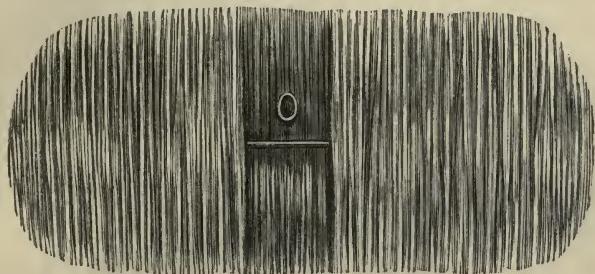


FIG. 23.—Wound surface of the same flap, showing the bridge of the acupressure pin compressing the artery—(*Drawn after Simpson*).

## SECOND METHOD.

FIG. 24.

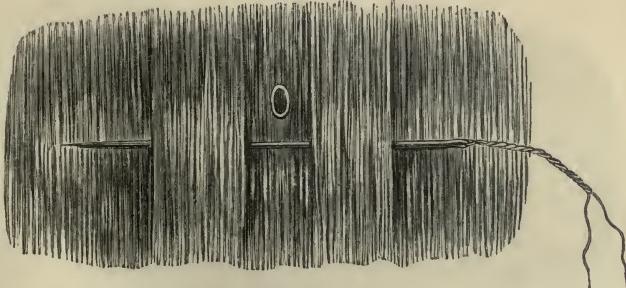


FIG. 24.—Second method, by means of an acupressure needle threaded with iron wire, to admit of its being withdrawn.

## THIRD METHOD.

FIG. 25.

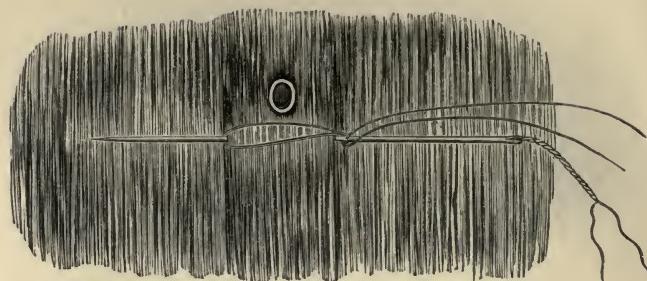


FIG. 25.—The Third method, by means of an acupressure needle threaded with iron wire, and a loop of inelastic iron wire.

## FOURTH METHOD.

FIG. 26.

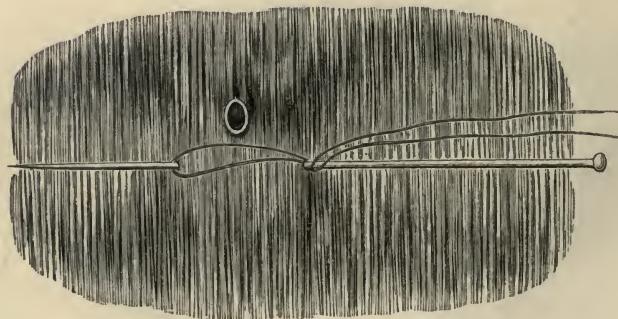


FIG. 26.—The Fourth method of acupressure by means of a long pin and a loop of iron wire.

## FIFTH METHOD.

FIG. 27.



FIG. 27.—Diagram showing the appearance of the parts at the termination of the first step of the Fifth, or Aberdeen, method by the twist, before making the quarter rotation with the pin.

FIG. 28.

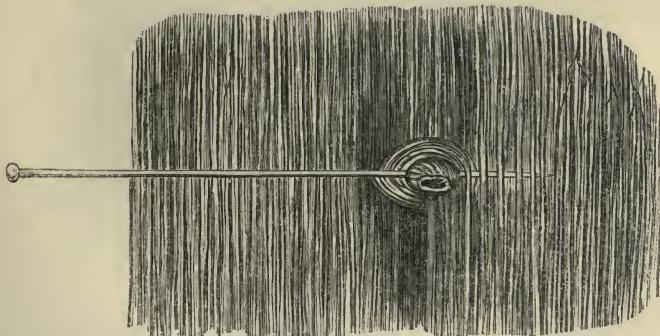


FIG. 28.—Fifth, or Aberdeen, method, with a quarter rotation of the pin. The diagram shows the appearance of the parts after the quarter rotation, and the ultimate insertion of the pin-point in the tissues beyond the artery.

## SIXTH METHOD.

FIG. 29.

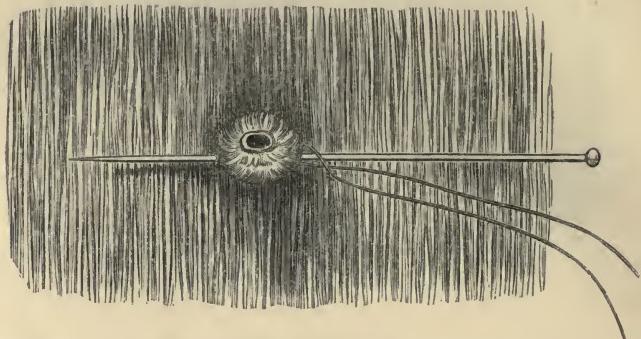


FIG. 29.—Showing the Sixth method, by means of a pin and a loop of iron wire.

## SEVENTH METHOD.

FIG. 30.

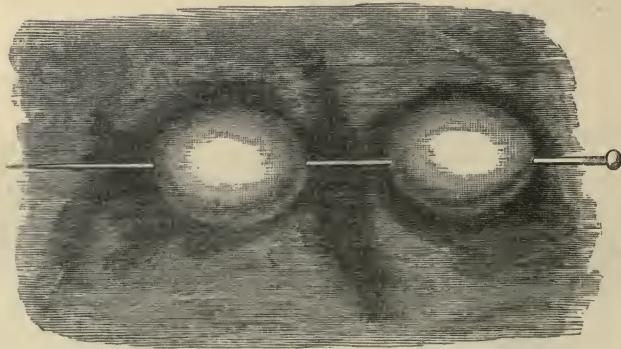


FIG. 30.—Showing the position of the pin in the Seventh method. The middle portion in front of the integument bridges over the artery to be acupressed, and the compression is effected between the middle portion of the pin in front and the bone behind.

## METHODS OF HEALING OPEN INCISED WOUNDS.

As all good writers have not given the same number of methods in which the healing of open incised wounds may be accomplished, and as, unfortunately, the same term has not invariably been employed to designate the same method of healing—that there may be no misunderstanding as to the method by which healing was believed to be effected in the cases related in the next chapter, and that there may be no misconception regarding the impressions wished to be conveyed in the chapter on the *Appreciation of acupressure*, I think it advisable to state that the nomenclature adopted by me is that employed by Mr. Paget in his admirable writings on the methods by which healing is accomplished in open incised wounds. So far as my reading has enabled me to judge, these methods are nowhere more lucidly or instructively described than they are by Mr. Paget. My object simply is to enumerate the methods—to mention the names by which they are designated—and to state as much as may be necessary to prevent all dubiety as to the methods referred to in future parts of this publication.

The healing of open incised wounds may be accomplished in five methods :—

FIRST.—By immediate union, or union by the first intention.

SECOND.—By primary adhesion, or union by adhesive inflammation.

THIRD.—By granulation, or union by the second intention.

FOURTH.—By secondary adhesion—or the union of granulating substances—or by the third intention.

FIFTH.—By suberustaceous cicatrization, or by scabbing.

FIRST—HEALING BY IMMEDIATE UNION, OR BY THE FIRST INTENTION.

In healing by immediate union, or by the first intention, there is no evident determination of blood, no inflammation, no exudation of reparative material, no discernible intermediate substance of union, and no traces left of where the parts had been separated from each other. The wounded surfaces being brought and maintained in contact, become conjoined without any new material being formed for accomplishing re-union,

and hence this method is called that by immediate union. For the accomplishment of this method—of which several examples will be found in the next chapter—the essential conditions are :—perfect coaptation of the incised surfaces, and the entire absence of the inflammatory process.

SECOND—HEALING BY PRIMARY ADHESION, OR UNION BY  
ADHESIVE INFLAMMATION.

This method of healing differs from the former, in the presence of reparative material in the plane at which the parts were separated. This new material—fibrine, lymph, or nucleated blastema—exudes from the cut surfaces as a product of adhesive inflammation, and unites them together. In this exudation, in consequence of a creative force with which it is endowed, nuclei become developed, and, under favourable circumstances, it becomes transmuted into fibres and connective tissue—the permanent substance of repair.

*Principal Constituents and Varieties of Lymph.*

In inflammatory lymph two essentially different constituents are found, namely :—fibrine, and certain bodies, “the exudation cells” of some authors, “the plastic corpuscles” of Bennett, and “the pyoid” of Lebert. The characters of the lymph differ remark-

ably, according as the fibrine or corpuscles predominate ; and these differences, in proportion, give rise to the two varieties of lymph so well known to surgeons, namely :—

FIRST.—The true healthy coagulable lymph of some authors ; plastic of Williams ; fibrinous of Paget ; and simple or plastic of Rokitansky.

SECOND.—Aplastic of Williams ; corpuscular of Paget ; and croupous of Rokitansky.

FIRST.—Fibrinous lymph exudes from the vessels in a fluid state, but soon becomes coagulated, and presents to the naked eye the appearance of a greyish or pinkish white, semi-transparent, adhesive substance, uniting the surfaces of the wound together. By the aid of the microscope it is seen to have a filamentous structure, and made up of innumerable fibrillæ interlacing with each other in every direction. On chemical examination it is found to be composed of fibrine, with an admixture of a small portion of oily and saline matters.

The conditions favourable for the formation of this variety are—a healthy condition of the blood—clean cut surfaces—and a very slight grade and healthy character of inflammation. Of the two forms of transmutation, namely—development and degeneration—development into fibres and fibro-cellular tissue is

the change to be looked for in favourable circumstances.

SECOND.—The corpuscular variety of lymph consists of corpuscles floating in a thin clear serous fluid, and has no tendency to coagulate. It indicates a cachectic state of constitution ; and, when formed, it has no tendency to development, but to degenerate—and the form of degeneration usually is that into pus.

*Conditions which Influence the Character of the Lymph.*

Whatever conditions decide the predominating character of the lymph will, in a great measure, determine whether development or degeneration—or, in other words, whether primary adhesion or suppuration—will take place. Other circumstances may be found to exert an important influence ; but Mr. Paget has very clearly shown that the fibrinous or corpuscular character of the exudation is in a great measure determined by, or referable to, three causes, namely :—the state of the blood—the seat of the inflammation—and the degree and character of the inflammation. In healthy persons the exudation abounds in fibrine, has a tendency to coagulate, becomes firm and elastic, undergoes development into fibres and fibro-cellular tissue ; and in such persons union by primary adhesion is easily obtained. Whereas, in cachectic patients, the lymph

is corpuscular, thin, remains fluid, degenerates into pus ; and the most favourable modes of healing are rarely attained. It has long been well known that the nature of the tissue affected usually modifies the product and the result of the inflammation ; of which, adhesion in serous, and suppuration in mucous membranes, furnish familiar examples ; but the influence of tissue is sometimes overborne by certain conditions of system and characters of disease, as we find exemplified in empyema and in croup. In the former—suppuration is a result of inflammation in a serous, and in the latter—fibrine is a product of inflammation in a mucous membrane. The degree and character of the inflammation exert a powerful influence in modifying the constituents of the exudation, and, consequently, in determining the method of healing. A mild grade and healthy character of the inflammatory process being favourable to fibrinous lymph, and a high degree or an erysipelatous character of inflammation giving rise to corpuscular lymph—rapidly degenerating into pus. The influence of the above mentioned conditions must be carefully considered in forming a just appreciation of acupressure and of other proceedings in the healing of wounds.

Such are the doctrines held regarding this mode of healing by those who believe that the reparative material is an exudation, and that, by a transmutation of the exudation, the permanent tissue of repair is

constituted. The theory of this process, however, now taught by various distinguished men, is that the nuclear or germinal or living elements of the wounded part attract liquor sanguinis from the blood, that they grow very rapidly, that, by growth and fissure, they form a structure which, under the microscope, presents a fibrous nucleated appearance, and that this substance is formed into the permanent tissue of repair.

THIRD—HEALING BY GRANULATION, OR BY THE  
SECOND INTENTION.

The Third and Fourth methods of healing open incised wounds are admirably described by Mr. Paget, and I cannot resist giving the description in his own words. "Healing by granulation may be exemplified by any incised wound left open and kept moist. Such a wound becomes coated, or, as it were, glazed over with a whitish film containing abundant white blood-cells. If the surfaces of a wound thus glazed be brought together, they will unite—the film probably becoming organized and forming part of the bond of union. If they be left open, the film increases, so as to form a thin greyish or yellowish white layer, which takes part in the formation of granulations. But before granulations form, a period elapses, varying from two to ten or more days, according to the extent of the wound and the tissues involved in it, in which

no visible change occurs in the injured parts. Probably during this period of inculcation, as it is called, the blood is stagnant in the vessels for some little distance from the wound ; and the renewal of its streams, and their increase of size by such an afflux as ensues in inflammation, constitute the first visible step in the healing process. The change in the supply of blood may be best seen on the margin of cut skin, where it commences in from two to four days after the wound ; or of bone, where it commences on cancellous tissue in about a week, and in compact tissue in ten days or more.

The first appearance of granulations, which may commonly be seen in less than a day after the appearance of increased vascularity, is that of a layer of soft adhesive white or pale-pinkish substance on the surface of the wound. In another day or less this may become vascular, with blood-vessels growing into it from those of the subjacent parts, and then, while it gradually increases to about a line in thickness, it acquires all the characters of granulations—a bright ruddy substance, soft, elastic, easily broken, succulent, and abundantly vascular, granulated on the free surface, and at the attached surface intimately united with the tissues on which it is placed.

In minute structure the new-formed granulations consist of cells, like those of inflammatory lymph, heaped together without apparent order, and connected

by very little intermediate substance. Blood-vessels with walls of simple membrane extended into the cellular mass from the adjacent tissues. The largest vessels pass in lines directed nearly straight towards the free surface of the granulations, communicating in their way by many branches, and ending near the surface in loops or arches.

The further stages of the healing process consist in the gradual development of the substance of the granulations into those of a scar, *i.e.* into fibro-cellular or connective tissue, and a superficial layer of epithelium. The former is developed progressively from the deeper to the more superficial part of the layer of granulations ; the latter, from its borders to its centre. With the progress of the development, the layer of granulations becomes paler, drier, thinner, and less vascular ; and, as the epithelium forms on it, it becomes smoother, and changes its ruddy tint to a dim purple or pink.

Again, while granulations are forming, and till they are covered with cuticle, or "skinned over," pus is constantly being produced on their free surface. The earliest exudations flowing from open wounds are albuminous liquids nearly clear, viscid, ready to dry into adhesive scabs, and containing comparatively few cells. The gradual transition to the characters of genuine pus indicates a corresponding progress in the formation of granulations, and thenceforward their

characters are mutually indicative. Healthy and developing granulations always produce, and are indicated by, normal pus, *i.e.* by pus which is creamy, opaque, uniformly liquid, yellowish-white, and sufficiently abundant to cover completely the whole surface of the granulating wound. On the other hand, all defects and diseases of granulations are attended with morbid characters of pus."

FOURTH—HEALING BY SECONDARY ADHESION, OR THE THIRD INTENTION, *i.e.* BY THE UNION OF GRANULATIONS.

"Healing by secondary adhesion, or, as it may be called, by the third intention, is accomplished by the union of two granulating surfaces (*e.g.* those of two flaps after amputation) placed and maintained in contact. In this state the two surfaces simply unite, or else new material, produced from either or both surfaces, adheres to both, and thus unites them. The two layers of granulations thus form one layer, which, however, having no free surface, produces no pus, and is gradually developed into connective tissue. The process is very similar to that by primary adhesion; but in that the lymph on the cut surfaces is not developed into granulations before the union. All granulations, however, will not thus unite; they must be healthy, not like those of sinuses, not profusely suppurating, not exuberant or ædematous."

FIFTH—HEALING BY SUBCRUSTACEOUS CICATRIZATION,  
OR BY SCABBING.

This mode of healing—known also as that by the incrusting or modelling process—is best adapted for wounds presenting a single, superficially denuded, surface, perhaps of considerable extent, but of little depth. The nature of this process has not been fully investigated, but it is believed to consist chiefly of the coagulation of the blood or other exudations of the wound into a crust, and the formation of a cuticle without granulations underneath it. The absence of granulations and other new structures is believed to furnish the explanation of the fact that the cicatrix formed in this way is less liable to contraction than that in any other method of healing. Inflammation suspends and prevents this method of healing, and, in consequence, it is not of very frequent occurrence in the human species; but wounds heal very rapidly in this mode in the inferior animals, where the tendency to inflammation is far less than in man.

In forming a just appreciation of the merits of acupressure, it will be necessary to consider its advantages in reference to each of the five methods of healing, and this will be done in a future section.

## CASES OF ACUPRESSURE.

In the hope that other Surgeons may be induced to favour the profession with the benefit of their experience of acupressure, I now proceed to give a brief account of thirty-two cases in which I have employed that method of checking haemorrhage. They comprehend the whole of the major operations in which I have employed this method of arresting haemorrhage ; but I have used it in many minor ones which I did not deem sufficiently important to be put on record. In every instance, in which I have employed acupressure, its use has been most satisfactory.

### CASE I.—AMPUTATION OF THIGH.

*Acupressure by the Third Method.*

A boy, 6 years of age, had amputation of the thigh performed, for disease of the knee-joint, on the 16th of March, 1864. The haemorrhage was speedily checked by the Third method of acupressure, four arteries having been secured by means of acupressure needles and loops of iron wire. The edges of the wound were brought into accurate apposition by means of silver sutures, and a single fold of linen was laid over the

end of the stump. The needles were removed in forty-eight hours, and no bleeding followed. The wound healed by primary adhesion, but as there were a few drops of pus, I did not consider the case a perfect example of that mode of healing without the slightest appearance of purulent secretion. There could not have been more than six or eight drops of pus in all, as there was not the slightest stain upon the linen, except on two occasions, when the stains were not larger than half the size of a sixpence. This was the first time I had ever employed acupressure, and the result produced a great impression on my mind, as it was the nearest approach I had ever seen to perfect primary adhesion without a drop of pus after amputation of the thigh, or after amputation of any kind.

The first two methods of healing described in the previous section are, first, by immediate union, or union by the first intention; second, by primary adhesion, or union by adhesive inflammation. That healing in this case was accomplished by one or other of these methods there could be no doubt, and I was convinced it was not by immediate union or the first intention, but by primary adhesion, as an exceedingly thin lamina of lymph was seen constituting the medium of union at the edges of the wound. According to the belief of those who hold the doctrines of exudation, the lymph was transmuted by development

into the permanent tissue of repair, but an exceedingly small quantity underwent degeneration into the six or eight drops of pus, which were formed in this case. But for these few drops of pus, I would have considered this case an instance of what, previous to the introduction of acupressure, I in vain longed to see, namely, an example of healing of an amputation wound either by immediate union or the first intention, or by primary adhesion without a drop of pus. I have not called this a *perfect* specimen of primary adhesion, as I have never applied the terms, perfect specimen of healing by the first intention, or perfect specimen of primary adhesion, to the healing of a wound of any kind where *a single drop* of pus was seen, however gratifying the conditions in all other particulars may have been ; and they could not have been more so than in this case.

#### CASE II.--AMPUTATION OF THIGH.

*Acupressure by the Fifth, or Aberdeen, Method—a Half Rotation of the Needle.*

Amputation was performed, on the 29th of June, 1864, upon a delicate girl, 13 years of age, for disease of the knee-joint. In this case the haemorrhage was speedily checked by a new method which I have called the Fifth, or Aberdeen, method—by the Twist. In this instance the Twist was to the extent of a half rotation of the needle. The history and the

varieties of the Fifth, or Aberdeen, method have been described, and, I trust, made intelligible, in the section on the different methods of acupressure. The needles were withdrawn in forty-eight hours, without a drop of blood following. Although the result of this case was most gratifying, still the union by primary adhesion was not perfect, as a little pus was formed near the margin at one angle of the wound. This was the first instance in which the femoral artery had ever been secured in this way.

## CASE III.—AMPUTATION OF THIGH.

*Acupressure by the Fifth, or Aberdeen, Method—a Quarter Rotation of the Needle.*

A man, 51 years of age, had his thigh amputated on the 20th of July, 1864, for disease of the knee-joint, and, at the same time, an enormous hydrocele of twenty years' standing was tapped. Acupressure by the Fifth method was employed, and the haemorrhage was completely checked. In this case a quarter rotation only was made by the needle, and the whole proceeding consisted of four movements :—First, the needle was inserted by the side of the artery ; second, its point was made to emerge as represented in Fig. 9 ; third, a quarter rotation was given to it ; fourth, the needle was secured by sending its point into the soft parts, as shown in Fig. 11. The needles were withdrawn

in seventy-two hours, and no haemorrhage occurred. It is probable that the needles were allowed to remain unnecessarily long ; but as this was the first time I had tried the method by the twist to the extent of a quarter rotation only of the needle, and as there was no experience to guide me, I did not think it judicious to remove them in forty-eight hours. In this patient one angle of the stump refused to heal, and six weeks after the operation he died from exhaustion caused by chronic bronchitis. When admitted into hospital he was suffering severely from extensive bed sores, which improved under treatment, but never thoroughly healed.

#### CASE IV.—AMPUTATION OF THIGH.

*Acupressure by the Fourth Method.*

Mrs. K., 66 years of age, was sent to the Aberdeen Hospital by Dr. Forbes of Fochabers, and admitted on January 7th, 1865, with the largest and most remarkable example of epithelial cancer I have ever seen. It affected the upper half of the leg, and involved the integument on the outer part of the thigh above the knee to a considerable extent. After a candid statement was given to her of the great risk of amputation of the thigh at her period of life, and in her particular state, she earnestly begged to have the thigh removed. Amputation was performed pretty high up above the

middle of the thigh, on January 11th ; and, owing to the situation of the operation and size of the thigh, the surfaces of the flaps were very large. With the exception of a case in which I performed amputation at the hip-joint, it was the largest wound I have seen in amputation of the thigh. It was a great object in this case to lose as little blood as possible, and five arteries were secured by long pins and wire loops in not more than half the time it would have been possible to do so by ligature. When the flaps were brought together, the heads of the pins and ends of the loops projected a little beyond the lips of the wound, and after the patient was put to bed, the pulsation of the femoral artery communicated an impulse to the pin by which it was secured, so that for two days the pulse could be counted by looking at the glass head of the pin. I have usually removed the needles in forty-eight hours, but in this case, while pulsation continued, I did not think it advisable to remove the pins till the third day, when the pulsation had ceased ; and then, seventy-two hours after the operation, I removed the whole of the pins and loops without a single drop of blood following, and the patient said their removal was unattended with pain. Considerable suppuration took place ; but notwithstanding the patient's advanced period of life, and the great size of the wound, it healed up perfectly, and she left the hospital much gratified with her state, and pleased with the kindness she had received.

## CASE V.—AMPUTATION OF THIGH.

*Acupressure by the Third Method.*

Alex. F., 14 years of age, of a highly scrofulous constitution, was sent to the hospital to have his thigh amputated, on account of destruction of the cartilages of the knee-joint and disease of the bones. When placed on the operation table he was very feeble, and required the administration of brandy. The physician who gave chloroform was alarmed at its depressing effect on the heart's action during one stage of the operation. The arteries were speedily secured by the Third method—needles and loops being used. There was little blood lost, and no haemorrhage afterwards, but the patient sunk in thirty-six hours, vomiting and symptoms of shock continuing during that period. The femoral vessels were cut out of the stump, without disturbing the needles and loops, by our able pathologist, Dr. Beveridge ; and I afterwards had an opportunity of seeing him make a very careful examination of them. The superficial femoral artery and vein were both included in the loop ; and before the vessels were opened it could be distinctly seen that the artery contained a coagulum extending upwards from the needle for an inch and three-quarters, and that the vein was empty to nearly the same extent. On removing the needle and loop, and on laying open the vessels, it was found that the artery and vein were

both free from any trace of inflammation, and that their coats were perfectly entire and uninjured where they had been embraced by the needle and loop. The obliterating coagulum in the artery was composed of three pieces, adherent to each other, and very slightly so to the interior of the artery.

## CASE VI.—AMPUTATION OF THIGH.

*Acupressure by the Fourth Method.*

Some weeks ago, Thomas G., an extremely emaciated and debilitated young man, 15 years of age, applied to me for advice on account of disease of his right knee-joint and lower third of the femur. The case presented all the symptoms, both local and general, of a well-marked example of medullary carcinoma, with the exception that there was no perceptible dilatation of the veins over the swelling—a symptom I have sometimes, though rarely, found absent in other cases. A few similar instances of the absence of dilated veins are recorded, in which, as here, the accuracy of the diagnosis was verified by examination of the tumour after operation. In compliance with the wishes of the patient and the members of his family, I, with the assistance of several of my apprentices, performed amputation at the lower part of the upper third of the thigh. Five arteries were secured by long pins and

wire loops, according to the Fourth method. The pins and loops were removed in seventy-two hours, without the slightest appearance of blood, and the patient, notwithstanding his great weakness, recovered very rapidly. The wound healed very quickly throughout, by primary adhesion, without one drop of pus, except at the inner corner, where there was a very little suppuration. The whole amount of pus did not exceed half a tea-spoonful. It certainly required great faith in acupressure as a haemostatic agent to prefer it in this case, as the loss of very little blood would have proved fatal to so feeble a patient. There were many points of great pathological interest in this case, but they are foreign to the object of this publication.

#### CASE VII.—EXCISION OF MAMMA.

*Acupressure by the First and Third Methods.*

For a large cancerous tumour in a female, 42 years of age, I removed, in the hospital, a mamma of great size, and acupressed four bleeding arteries : one by the First method, for which it was favourably situated, and three by the Third. For the First method, a long pin was used, and for the Third, acupressure needles threaded with iron wire, and loops of iron wire. The haemorrhage was completely arrested, and the wound closed by silver sutures. Six hours after the operation

there was slight bleeding, on account of which the house-surgeon opened the wound, and tied an artery which, he said, was not situated near any of those seen to bleed during the operation. The needles and pins were removed in forty-eight hours, and the ligature came away on the seventh day. Primary adhesion took place throughout this large wound, except in the track of the ligature, where slight suppuration continued until the end of the second week after the operation.

## CASE VIII.—EXCISION OF MAMMA.

*Acupressure by the Third Method.*

On March 8th, 1865, I excised the right mamma of a female, 35 years of age, and acupressed three arteries by the Third method. The vessels were relieved from acupressure in forty-eight hours, without the slightest appearance of blood, and the wound *healed entirely by immediate union, or the first intention*—a result which I had, up to that time, seen in two other cases only of excision of the mamma, but in them the vessels were so small as to require no ligature. The tumour was very large, but the wound healed without a single drop of pus, or the slightest appearance of exudation of any kind. This case, as well as the 7th, produced, on the gentlemen attending the Hospital, a strong impression in favour of acupressure.

## CASE IX.—EXCISION OF THE ELBOW-JOINT.

*Acupressure by the Third Method.*

Mrs. S., a delicate-looking woman, 22 years of age, on admission into hospital suffered great pain in her right elbow-joint, and had done so for many months. The slightest motion greatly aggravated the pain, and, in consequence, she could scarcely allow the limb to be moved. Involuntary startings of the arm caused excruciating agony, and often deprived her of sleep. The soft parts were greatly swelled ; several sinuses communicating with the joint discharged large quantities of unhealthy pus ; there were painful ulcerations on the lateral aspects of the elbow, and the poor woman was in a very debilitated state. This was an extremely unpromising case for conservative surgery ; yet, as soon as the patient was got into a state at all favourable for operation, I performed excision of the elbow-joint by the single perpendicular incision. One artery, which bled very freely, was acupressed by the Third method, and an extensive general oozing from other vessels was soon checked by cold water. The wound was closed by wire sutures, and the needle and loop were withdrawn in forty-eight hours, without being followed by any blood. The wound healed in three weeks, and, when the patient left the Hospital, the soft parts were gradually getting into a satisfactory state, while the general health was rapidly improving.

## CASE X.—EXCISION OF TESTICLE.

*Acupressure by the First Method—No part of Pin in the Wound.*

On the 6th of March, 1865, I removed a young man's left testicle for medullary cancer ; and at once checked the haemorrhage by seizing the integument containing the cord between the thumb and forefinger of the left hand, and with the other hand passing a pin by a single straight movement immediately behind the cord. No part of the pin was within the wound, as the integument was transfixed three-quarters of an inch higher up than its upper extremity. The wound was carefully closed by silver sutures ; no dressings were applied ; the vessels were relieved from acupressure in twenty-four hours ; no blood appeared, and healing by primary union was perfect. I cannot but consider that the entire absence of any foreign body in the wound in a great measure contributed to this favourable result. It is now seventeen months since the operation was performed, and the patient continues free from any return of the disease.

## CASE XI.—AMPUTATION OF LEG.

*Acupressure by the Fifth, or Aberdeen, Method—A Quarter Rotation of the Needle.*

A young man, 18 years of age, had amputation of the leg below the knee performed for disease of the ankle-joint and tibia, on the 14th of September, 1864.

Acupressure by the twist was successfully employed for securing the arteries, and the needles were withdrawn in forty-eight hours without any haemorrhage. It is no part of the method by the twist, as practised in Aberdeen, to transfix the artery, on the contrary, care is taken to avoid doing so. In this case, as in two amputations of the thigh, the needle was inserted by the side of the artery, its point made to emerge, a quarter rotation given to it, and the needle was then fixed by sending its point into the tissues beyond the vessel. Nearly a fortnight after the operation, secondary haemorrhage, caused by sloughing of the stump, took place on several occasions ; but it was easily subdued by elevation and the application of cold water. The sloughing was the result of erysipelas, which disease, with small-pox, prevailed at the time, and my patient was so unfortunate as to be seized with the latter, only three weeks after his recovery from erysipelas. This occurred before the wound was healed, at the part where there had been the greatest sloughing. After recovery from small-pox, the extremity of a bit of wire under the corner of the flap was discovered, and on its being pulled, a small needle, used in compressing a small artery, was withdrawn. The patient was much distressed from the day of the operation by starting of the stump, and frequently called for the nurse to hold it. The impression I formed was, that the wire must have been drawn in by some spasm of the muscles

before the removal of the larger needles ; and this accident suggests the necessity of leaving the wires sufficiently long to render such an event impossible. The wires with which the needles were threaded—the only wires in the method by the twist—were carefully arranged before closing the wound after the operation ; but unfortunately, or, perhaps, fortunately, as the case turned out, the small needle escaped my memory while the larger ones were removed. I have been told that a similar case, as far as disappearing of the wire is concerned, occurred in the experience of a surgeon in another part of Scotland. This unfortunate patient eventually got perfectly well ; and he came up to the hospital several months ago to show me how well he could walk with an artificial limb. The account by Ambrose Paré of his patient who was “merry with a wooden leg,” was brought to my mind by this poor fellow’s great delight at being again able to walk, and having, to all appearance, two limbs alike.

## CASE XII.—DEEP WOUND OF FOREARM.

*Acupressure by the Seventh Method—Perfect Specimen of Healing by immediate union or the first intention, or by primary adhesion.*

John McKay, a stout farm servant, 22 years of age, while descending a high unrailed stair, fell and struck the back part of his left forearm against the point of a

scythe, causing a wound six inches long, extending upwards to the head of the radius, and forwards between the bones. The seythe did not divide the whole of the muscles or any part of the integument in front. The haemorrhage was excessive ; there was no pulsation of the ulnar artery at the wrist, that of the radial was feeble ; and the impression conveyed to the finger on being placed over the last-mentioned vessel was that its size was not half that of the corresponding artery in the other forearm. The haemorrhage proceeded from the deep part of the wound in front of the forearm, and the bones rendered it impossible to dilate the wound so as to see the injured artery, which I supposed was the ulnar. The haemorrhage was perfectly suppressed by passing a strong needle, four inches long, into the soft parts in the middle of the arm, making it to emerge on the outer side of the humeral artery, bridging it over the artery and dipping it into the soft parts in the inner side of the arm, transfixing them, and bringing the point out very far back. This was easily done by pressing the soft parts forward with my left forefinger, while I guided the needle with my right hand. The moment the parts were allowed to recede, the haemorrhage was completely suppressed by the compression of the humeral artery between the humerus behind and the middle of the needle in front of the integument. The pressure after the parts were allowed to recede was considerable, and instantly

accomplished all that was desired. The pulsation of the radial artery, previously feeble, ceased the moment the soft parts were allowed to retract, but it soon again became perceptible. The wound was washed out and kept exposed to the air for half an hour, until it became quite glazed, when its edges were brought together by four silver sutures. No dressing of any kind was applied, and the needle was withdrawn in twenty-four hours. The silver sutures were removed on the third day, when the wound was perfectly healed, and furnished an admirable example either of healing by immediate union or the first intention, or by primary adhesion. It was impossible for me to determine with certainty of which of the first two methods of healing this case furnished a perfect example. There was not a single sign of inflammation—no discernible exudation of any kind, and the edges of the skin were in perfect contact without any appearance of a medium of union. I was much gratified with the result of acupressure in this case, and I do not know any other means by which this accident could have been brought to such a favourable termination with so little trouble to patient and surgeon. In this case, deligation of the bleeding artery was impossible from its depth and position, and stuffing the wound would have been most undesirable, and probably ineffectual. Acupressure accomplished every object desired with perfect simplicity, safety, and immediate success.

## CASE XIII.—EXCISION OF MAMMA.

*Acupressure by the First and Third Methods.*

In presence of my colleague, Professor Macrobin, and two other friends, I excised the left mamma of a female, 47 years of age, on account of a large tumour, which weighed sixty-one ounces, and exhibited in a marked degree the common and microscopic characters of medullary cancer. The resulting wound was necessarily very large, and five arteries required to be secured. Four of them bled profusely, and were acupressed according to the first method by means of three pins, one pin having been made to compress two vessels at some distance apart. The four arteries thus secured were favourably situated for the first method, and a small vessel in the bottom of the wound, which could not be acupressed by that method, was easily compressed by the third. Many Surgeons would have checked the bleeding from the last-mentioned artery by torsion, but I have strong objections to that proceeding, and never adopt it where healing is possible either by immediate union or primary adhesion. The wound was exposed to the air for about ten minutes, until it became glazed, when it was carefully closed by sutures and strips of isinglass plaster, the latter having been used to prevent the possibility of any tension near the sutures. The pins and needle were removed in forty-three

hours, and the sutures in three days. Notwithstanding the great size of the wound, it furnished a perfect example of healing by primary adhesion. Two or three drops of pus formed at the site of one of the sutures where there had been a little tension, but none whatever on the wound. Twelve months after operation, Professor Macrobin informed me that this patient continued free from any return of her disease. In this case, there can be no doubt that the operation was of advantage not only for present comfort but also for the prolonging of life.

## CASE XIV.—AMPUTATION OF ARM.

*Acupressure by the Third Method.*

On the evening of the 18th of August, 1865, I was called to Eliza Shirriffs, a delicate-looking girl, 7 years of age, who had just been carried into the Hospital with her right arm, from the wrist to above the middle of the arm, not only crushed and in a great measure denuded of skin, but almost pulpified in consequence of the wheel of a loaded cart having passed over it about an hour before my visit. It seemed to me very remarkable that there were scarcely any symptoms of shock ; and the only explanation I could suggest for their absence was the perfect death of the injured part. Chloroform having been administered, with the assistance of my able colleague, Dr. Keith, I amputated the arm by a long flap on the upper and

outer, and a very short one on the lower and inner aspect of the arm, and by sawing through the humerus at the upper part of the surgical neck immediately below the tuberosities. On the principle of removing as little as possible, and also for preserving to the poor girl the round appearance of the shoulder, I preferred this operation in this instance to amputation at the shoulder-joint, as it was possible to get a covering to the bone by making long and short flaps extending to the very edge of the pulpified parts. As the injury was caused by a weight passing over the extremity, and not by a dragging or tearing, I hoped the parts that appeared uninjured would not fall into gangrene. Every Surgeon of experience knows that in many cases of primary amputation, after injuries attended with straining, the parts composing the flaps appear sound at the operation, yet are so injured molecularly that they speedily pass into gangrene on the coming on of the slightest grade of the inflammatory process.

Three arteries were acupressed according to the Third method by needles and loops. One of the vessels was the axillary artery ; and this was the first time it ever was acupressed in this Hospital. The passing of the needle below and the loop above the axillary artery was greatly facilitated by taking hold of the mouth of the vessel with the artery forceps, and drawing it out very slightly—a proceeding Dr. Keith, Dr. Fiddes, and myself have since sometimes found useful

for making it easy to acupress an artery in a confined corner of a wound. The needles and loops were all removed in fifteen hours. Those belonging to the axillary and another artery were brought away as usual without the slightest difficulty, but there was a little resistance in the drawing out of the third needle, owing, as was found on its removal, to the wire with which it was threaded having kinked. About six or eight drops of blood followed the removal of the third needle, but the manner these drops came away satisfied me that they came from the track of the needle, whose head, owing to the kinking of its wire, caused slight laceration while being withdrawn, and not from the artery which the needle was used in securing. I think this is the only instance I have ever seen in which a single drop of blood appeared on the removal of needles, pins, or loops used in acupressure. Notwithstanding the diversities of structure forming the wound, and the amputation a primary one, there were no signs of inflammation—no discharge of any kind ; and I considered this a perfect example of immediate union or union by the first intention. There could be no doubt as to its being a perfect case of this mode of healing or of that by primary adhesion, but as there were no signs of inflammation, and no apparent medium of union, I concluded that the case exhibited the characters of the former and not those of the latter method of healing—in other words, I believe that it furnished an example

of the First and not of the Second method of healing. In two weeks the girl was out of bed, and she left the Hospital on the 19th of September, in perfect health, but evidently greatly distressed to leave the nurse and the patients who had all been very kind to her. I never yet saw so perfect a specimen of immediate union or of primary adhesion after any amputation where ligatures were used ; and the case proves that diversity of structure, however unfavourable, does not always render it impossible to obtain either immediate union or union by primary adhesion. Apart altogether from all reasoning or argument on the subject, from my own experience, I am as much convinced as I could be of any point in practical surgery, that it is impossible to obtain perfect examples either of immediate union or of primary adhesion without some pus being formed in the tracks of the ligatures when deligation is used, but that with acupressure both methods of healing are often attainable without a single drop of pus.

## CASE XV.—REMOVAL OF MAMMA.

*Acupressure by First and Third Methods—Two arteries secured by the same pin.*

On the 24th of September, Margaret Gordon, 28 years of age, a servant, moderately stout, was admitted into Hospital with a well marked example of fibrous

cancer of the right mamma. The disease was in its first stage, and there were no signs of lymphatic invasion. Unfortunately for the poor woman's peace of mind, she was told, before her admission into Hospital, that her disease was cancer, and she was in the greatest alarm. Under these circumstances it clearly was a duty to excise the mamma, and I performed the operation, according to the usual method, on the 27th of September. Three vessels were acupressed—two of them at the axillary extremity of the wound bled very energetically, and were both secured by a single long pin, used according to the First method, the part of the needle within the wound being perfectly sufficient for arresting the haemorrhage from both vessels. The third artery was in the middle of the wound, and was secured by a needle and loop, used according to the Third method. In twenty-four hours the two arteries secured by one pin, and the third by a needle and loop were relieved from acupressure, without the appearance of a drop of blood. No dressings were kept at the wound ; and, in my opinion, this was a perfect example of immediate union throughout the whole of the wound. This patient left the Hospital on the 13th of October ; and as the common and microscopic characters of the fibrous cancer were as marked as I have ever in my experience seen, it was depressing to witness the great delight the poor woman was in from her having the gratifying and firm, but I fear sadly

delusive, belief that she was now for the future perfectly safe from all danger of cancer. Previous to operation, her life was rendered perfectly miserable by the alarm the name of her disease caused in her mind.

My assistant, Mr. McCrae, had the goodness to prepare for me the following report of a case in which I performed an operation for the removal of an erectile tumour.

CASE XVI.—ERECTILE TUMOUR—REMOVAL BY EXCISION.

*Acupressure by the First Method—Cure by immediate union.*

“John Miller, aged 7, native of Aberdeen.

“*Previous History.*—His mother states that when he was born she noticed a purplish flat mark, about the size of a half-crown piece, in the skin over the middle of the back of his right leg. She also states that soon after birth the mark became prominent, and grew in all its dimensions with the boy’s growth. When four years of age he got a blow from a stone upon the tumour, which gave some uneasy sensations, and caused slight inflammation for a few days. Otherwise the tumour never gave any inconvenience ; and he could walk quite well until the summer of 1865, when he had another blow on the part which caused inflammatory action and permanent limping. She also says

that the tumour is always increased in size when the boy cries, makes any exertion, or is in bad health. In September, 1865, his mother brought him to Professor Pirrie who observed the following :—A tumour behind the right calf extending downwards from about two inches below the knee-joint, its size about that of a goose's egg, with one-half cut away in a longitudinal manner, or, in other words, about four and a half inches long, its long diameter being in a line with that of the leg, three inches broad, and one and a half deep at the centre, its most prominent part. It was doughy to feel, without obvious fluctuation or pulsation, and the skin over it was of a natural appearance, with the exception of some slight inflammatory redness induced by over-exertion. The boy was ordered to keep in bed for two days, with the limb a little elevated, and to have a light poultice applied to subdue all inflammation preparatory to operation.

*“Operation.*—Chloroform having been administered, and the boy placed in the proper position, that is horizontally, with the calf turned up, Professor Pirrie made an incision five inches long over the centre of the tumour from its upper to the lower end, cutting through the skin and subcutaneous structures. The skin was then removed on either side, and the excision of the tumour completed by dissecting it from the aponeurosis covering the gastrocnemius muscle. The tumour was composed of erectile tissue, and derived nearly all its blood

from an artery as big as a quill, which pierced the gastrocnemius muscle in an oblique direction from above, downwards and backwards, and bled most profusely. A pin four inches long with a pretty large head was passed perpendicularly to the surface through the skin of the inner flap, and the belly of the gastrocnemius half an inch above the bleeding point, and a little to its inner aspect. It was then turned abruptly, made to pass underneath the artery, and brought out through the integument on the opposite side. The edges of the wound were then brought together by means of silver sutures, and the only dressings were a little surgeon's lint and cold water. The sutures were taken out by the writer of this report on the fifth day after operation, at which time the wound was entirely healed."

*Remarks.*—This case was a perfect example of that mode of healing, properly called by immediate union, or union by the first intention. The tumour was chiefly composed of large blood spaces which opened freely into each other, and were traversed by numerous vessels, of which arteries seemed to form by much the larger proportion.

This patient has been at school for the last three months. While walking he has no sensations in the one leg different from those of the other, and the only trace of an operation is a white but very indistinct line on the back of the leg. This was an

admirable case for testing the efficiency of acupressure, and it cannot be denied that it fulfilled the indication for which it was employed most perfectly and immediately, and without giving rise to a single undesirable result. One of the many advantages of acupressure is the great variety of modes in which it can be employed ; and the judgment of the surgeon is shown in selecting the one most suitable to the particular circumstances of the case. The mode employed here left nothing to be desired ; and after a careful perusal of this case the surgeon most prejudiced against acupressure will find it difficult to convince himself that if the ligature had been used the result would have been in every particular as satisfactory.

The reports of the two following cases were written by Dr. Aitken, late House Surgeon of the Aberdeen Hospital, and now of Greenock.

#### CASE XVII.—EXCISION OF ELBOW-JOINT.

##### *Acupressure by Fourth and Fifth Methods.*

“Helen Ritchie, aged 20, servant, was admitted into the Aberdeen Royal Infirmary, under the care of Professor Pirrie, on the 11th of July, 1865.

“*Previous History.*—Patient states that about four months ago she, while engaged in household work,

gave her left elbow a sudden twist, that before evening the joint had begun to swell and stiffen, and had become painful, and that from that period to the date of her admission it got gradually worse.

*"On admission.—Joint exceedingly swollen and painful. During the first fortnight these symptoms continued to increase, and the patient was very feverish and weak. An incision was then made along the outer aspect of the joint, giving vent to a quantity of matter, but although this was followed by great relief, the patient was not considered in a fit state for operation till the 27th of September, when excision of the articular extremities of the bones was performed by Professor Pirrie, by means of a single longitudinal incision along the posterior aspect of the joint. Three arteries bled freely, and the haemorrhage in the case of two of them was arrested by pins applied by the Aberdeen twist, or Fifth method, and the third was acupressed by a pin and loop, according to the Fourth method. The edges of the wound were brought together by fine metallic sutures, supported by strips of isinglass plaster, and the wound was covered from the air by a single fold of wet lint. The pins were removed in twenty-four hours, without being followed by a single drop of blood. For the first week or ten days there was a free discharge of matter from the wound. Flour poultices and tepid water dressings being employed for the greater part of that time, and thereafter it granulated healthily under red lotion dressings."*

12th November.—Wound nearly healed. To have the joint supported by a light pasteboard splint and sling, and to get out of bed.

21st November.—Has been going about for the last nine days. Wound is now almost entirely healed. On the 30th November she was dismissed, cured."

CASE XVIII.—EXCISION OF ELBOW-JOINT.

*Acupressure by Fourth Method.*

"Isabella M'Bean, aged 15, servant, was admitted to the Aberdeen Royal Infirmary, under the care of Professor Pirrie, on the 1st of August, 1865.

*Previous history.*—Patient states that she is not aware of having ever received any injury on the part, but that in May, 1864, she began to feel pain in the left elbow during the day; that in winter 1864-65, it began to swell and stiffen, the pain getting considerably more severe. The symptoms all became gradually more aggravated, and, shortly before admission, an abscess formed and burst a little above the internal condyle.

*On admission.*—During the fourteen weeks she spent in the hospital prior to operation, four other abscesses formed and were opened—one beneath, and another above the external condyle—one in front of the joint, and another large one a little above the middle of the anterior aspect of the forearm.

November 8.—Chloroform having been administered, Professor Pirrie performed the operation of excision, removing about an inch and a quarter of the ulva, nearly half an inch of the radius, and about three quarters of an inch of the humerus. In this case, in consequence of the numerous sinuses burrowing round the joint, instead of operating as usual by the single longitudinal incision, Professor Pirrie adopted the H incision—the soft parts in the various lines of that form of incision having already been destroyed by the numerous and extensive ulcerations. To stay the bleeding, three pins with wire loops were employed, according to the Fourth method, and the wound was closed by wire sutures. The pins were removed in 24 hours, without a drop of blood being seen.

On the 10th of November, the wound began to discharge a considerable quantity of unhealthy-looking pus, especially where one of the incisions had laid open one of the sinuses ; and on the 11th, this part of the wound was touched with the tincture of iodine.

November 21.—Since the application of the tincture of iodine, the wound has assumed a most healthy appearance. The external longitudinal incision is for the most part cicatrized, and the internal longitudinal and transverse incisions are granulating healthily. Strips of isinglass plaster and red lotion are the only dressings.

On the 30th of November, the patient was dismissed ; the wound being all but perfectly cicatrized."

With the single exception of this case, I have for many years invariably performed excision of the elbow-joint by the single perpendicular incision, and the experience of seventy-one cases has satisfied me that, theoretically and practically, it is the best.

## CASE XIX.—WOUND OF FOREARM.

*Acupressure by First Method.*

John Henderson, 26 years of age, by occupation a labourer, was brought to me on the 30th of August, 1865, in consequence of an incised wound he had just received immediately above the wrist. The wound was an inch and a-half in length—oblique in point of direction—the radial artery was wounded—and blood flowed very freely. The haemorrhage was speedily arrested by the First method of acupressure. That no part of the pin might be within the wound, I acupressed the radial artery half an inch higher up than the upper extremity of the wound. I washed out the wound very carefully—kept it exposed to the air for about a quarter of an hour—brought its edges into perfect apposition by means of two strips of isinglass plaster, and thereafter applied a plastic splint to the back of the forearm and hand, for the purpose of preserving the parts at perfect rest. The radial artery was relieved from acupressure in fifteen hours, and the

two bits of isinglass plaster—the only dressings—were removed in six days, when the wound was perfectly healed. This case furnished a nice example of the First mode of acupressure, and of the First method of healing an incised wound.

CASE XX.—HÆMORRHAGE FROM SLOUGHING OF THE BALL  
OF THE THUMB.

*Acupressure by First Method.*

On the evening of the 16th of September, I was called to James Hutcheon, 50 years of age, and found him affected with smart hæmorrhage caused by sloughing of the ball of the thumb, which took place in the progress of a bad form of paronychia. By acupressing the radial artery, according to the First method, about two inches above the wrist, the hæmorrhage was instantly and perfectly arrested. The acupressure was removed in sixteen hours without any return of hæmorrhage; and after a number of weeks the patient, who was exceedingly weak, got well, and the hand healed by granulation and cicatrization, or, in other words, by the second intention. This case furnished an example of the First mode of acupressure, and the third mode of healing.

## CASE XXL.—WOUND OF HAND.

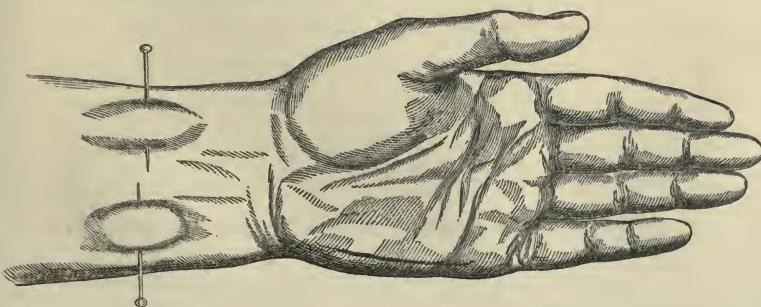
*Acupressure by First Method.*

Helen M'Grigor, a very stout person, 37 years of age, by occupation a cook, was brought to me on the morning of the 8th of July, 1865, on account of a deep wound in the palm of her left hand. The patient's account of her accident was, that, about a quarter of an hour before I saw her, she was engaged in cutting some ham, and that while keeping it steady by grasping the end of the bone with the left hand, with the palm directed upwards, and using the knife with the right hand very forcibly on account of the hardness of the ham, the knife, which was sharp at the point, as I afterwards saw, slipped from the ham, and was driven deep into the palm of the left hand. The haemorrhage was extremely profuse, notwithstanding energetic compression by means of a towel, folded as it comes from the laundress, being forcibly pressed against the wound. On removing the towel, I found the wound was on the ulnar aspect of the palm of the hand, in front of, and parallel to, the metacarpal bone of the little finger—that it was two inches in length, and more than that in depth—that the plane of it extended transversely in front of the metacarpal bones, and that when the portion of the probe used in ascertaining the depth of the wound was placed in the same direction in front of the hand, it extended from the

edge of the wound to a point opposite the commissure of the middle and forefinger. On compressing the ulnar artery above the wrist, the haemorrhage, which was profuse, ceased completely for three or four seconds, and then became as great as formerly, but on pressing the radial artery as well as the ulnar it was perfectly arrested. In these circumstances I thought it advisable to employ acupressure by means of two pins, using them according to the First method, but remote from the situation of the wound. For facilitating their insertion the hand was bent forwards, when one pin was inserted by the ulnar side of the ulnar artery above the wrist, passed under the artery, and brought out abruptly on its radial side. The second pin was inserted on the radial side of the radial artery, sent underneath it, and brought out abruptly on its ulnar side. The moment the hand was placed in a line with the forearm the haemorrhage was perfectly arrested. After waiting for half an hour, during which time a single drop of blood did not escape, I ventured to clean the wound most thoroughly by means of cold water thrown into it with a glass syringe; and on thus washing out the wound and removing all coagulated blood, I had the satisfaction of seeing that there was no return of haemorrhage. After waiting about a quarter of an hour longer, until the wound presented a glazed appearance, its edges were brought together and preserved in apposition by means of a single broad

strip of adhesive plaster. The haemorrhage having been completely arrested, the wound perfectly freed from all coagulated blood, its surfaces having been exposed until they became glazed, and perfect coaptation having been obtained, the next desirable indication was to maintain the wounded structures in a state of perfect repose. This indication was fulfilled by means of a pasteboard splint and bandage. The splint was accurately moulded to the back of the forearm and hand, and extended from the elbow to the points of the fingers. A single fold of surgeon's lint was placed between the splint and skin, the forearm and hand were very gently and lightly bandaged to the splint, and then comfortably placed in a sling with the hand considerably elevated. At the end of twenty-four hours the wound was perfectly healed, and I had no doubt it was by the process of immediate union or union by the first intention. After removing the plaster, but before relieving the vessels from acupressure, Mr. McDonald took the accompanying sketch from nature :—

FIG. 31.



The only result of withdrawing the pins twenty-four hours after the accident was the immediate subsidence of a sensation in the little finger and adjacent side of the ring-finger, which commenced the moment the hand was rendered straight, after the introduction of the pins, and which the patient described as "a curious sleeping and tingling feeling." This sensation was no doubt caused by the stretching of the ulnar nerve by the pin used in acupressing the ulnar artery.

I observed at my first interview with the patient that she had not the power of bending the last phalynx of the middle finger, owing no doubt to the division of the tendon of the flexor profundus going to that finger, but when I last saw her, precisely eight weeks after the accident, the power was perfectly restored. A single drop of pus never formed in this case ; and acupressure unquestionably contributed most materially to the accomplishment of a result as gratifying as could possibly be desired. This was an admirable example of the First mode of acupressure, and of the first method of healing of an incised wound.

CASE XXII.—EXCISION OF PART OF THE FIBULA.

*Acupressure by Third Method.*

John Mill, an unhealthy-looking young man, 17

years of age, by occupation a combmaker, was brought to the hospital on the 13th of June, 1865, and placed under my care, on account of a tumour on the upper part of the left fibula.

The history given to me was that he had always been delicate—that for a long time he had almost constantly been more or less troubled with looseness of his bowels—that about nine years ago he first discovered a swelling on the outer part of his left leg—that until eight months previous to his admission into hospital it increased very slowly, and gave rise to little inconveniences—that since then, to use his own words, “the swelling has grown very rapidly, and is so painful as to keep me from sleep”—and that for some time he had extreme difficulty in walking and great uneasiness afterwards.

On examination, the tumour was found to begin half an inch below the uppermost point of the fibula—to rise very abruptly—to extend four inches downwards—to occupy to that extent the whole of the space between the bones in front, and to press firmly against the tibia. It formed a very prominent and perfectly incompressible swelling on the anterior, external, and posterior aspects of the leg, and extended from the tibia in front around the fibula to near the tibia behind. There was reason to fear that it came into contact with the tibia behind, where, as well as in front, it was exceedingly prominent; but the soft

parts rendered it impossible to ascertain correctly the posterior and inner relations of the tumour, however desirable, in view of an operation of excision, it unquestionably would have been to have perfectly reliable knowledge on that point. The patient did not complain of tenderness on touching the tumour. There were no symptoms of inflammation ; and the pain was undoubtedly a pressure symptom. The peronel nerve could be distinctly traced to the upper and back part of the tumour and felt to rise upon it. When either the tumour or the fibula was moved, the tumour and bone moved together.

The pulse was feeble, the body was emaciated, and the tongue had a raw appearance.

The diagnoses arrived at was that the case was one of enchondroma of the fibula ; and the resolution formed was to perform excision of part of the fibula in preference to amputation of the leg, provided it should be found possible to do so without cutting, along with the anterior tibial artery, which it clearly would be impossible to save, the popliteal, the posterior tibial, or the peroneal. There could be little doubt that cutting the popliteal or posterior tibial, or perhaps the peroneal, in the event of there being that well-known variety in which the peroneal is larger than the continuation of the posterior tibial, would, together with the unavoidable division of the anterior tibial artery and the necessary amount of dissection for

removal of the tumour, be followed by gangrene of the leg. To have a foot of any service for walking, it was indispensable to avoid cutting the peroneal nerve ; and, to diminish the risk of excision being followed by synovitis of the knee joint, for anatomical reasons that need not be stated, it was necessary to leave a small part of the head of the fibula. It seemed extremely doubtful if it would be found practicable to secure all these desirable conditions in any operation of excision ; but, as almost anything short of destroying the life of the patient is justifiable in conservative surgery, when there is a reasonable prospect of saving a limb, I thought it would be judicious to attempt excision, as soon as, by medical treatment and strict regulation of diet, the bowels and general health should be got into a state suitable for an operation. By the beginning of August the bowels and general health were considerably improved, and although the patient's state was far from what a surgeon would wish before venturing on a surgical proceeding, yet as the pain and want of sleep rendered it unlikely that further favourable change would be obtained, on the 8th of August it was resolved to perform the operation on the following day.

The patient having been brought under the influence of chloroform, the limb having been laid upon its inner side, with the leg well bent, and the femoral artery compressed by Dr. Fiddes, I made an incision

six inches long, beginning at the head of the fibula, ending on the spine of the tibia, and directed sufficiently inwards to avoid the peroneal nerve. The coverings of the tumour on the tibial side of the incision were quickly dissected inwards, and then those to the fibular side on the front and external aspect of the swelling, and the tissues between the bones were carefully turned backwards to a sufficient extent to make a clearance for the saw. In the movements of the knife in this stage of the operation the anterior tibial artery was divided, which was foreseen to be inevitable ; but in accomplishing this part of the denudation of the tumour and bone, and in making a clearance for the saw, the peroneal nerve above and the anterior tibial below were turned back without being injured or their function in the least impaired. The immunity from injury on the part of the peroneal nerve was owing to two circumstances :—First, the edge of the knife was kept moving close on the tumour, so that the tissues were cut upon the tumour and only at their adhesion to it. Second, the nerve had the relation dissection has almost constantly revealed between the trunk of a nerve and a cartilaginous tumour in close proximity—namely, it passed over it in a winding depression between irregularities of the tumour, and was not involved in its substance. The fibula was then divided above and below the tumour by means of a strong metacarpal saw which

I got made many years ago, and have often found convenient in resections of bones. The upper division was less than half an inch below the uppermost point of the bone. I then took a firm hold of the tumour by means of a large vulcelum, and while I pulled it energetically forwards and inwards, and Dr. Keith kept the posterior flap backwards, I relieved the tumour from its deep and posterior attachments without wounding the popliteal, the posterior tibial, or the peroneal artery. In this stage of the operation the tissues were cut by keeping the edge of the knife moving close upon the tumour. The anterior tibial artery, which was greatly enlarged and bled profusely, was quickly acupressed by a needle and loop, used according to the Third method, and the haemorrhage was perfectly suppressed. When all oozing had ceased, and the wound had taken on a glazed appearance, its edges were brought together by means of metallic sutures. No dressings were applied at first, and the patient was placed in bed with the limb slightly raised, laid on its inner side and the leg a little bent. The anterior tibial artery was relieved from acupressure in twenty-four hours, and neither at that time nor at any other, from the moment the loop was drawn over it, did a single drop of blood escape from it.

In this case the vacuity was such that, in my opinion, healing only by granulation could be hoped for. It did not therefore appear to me a matter of

almost any importance whether the ligature or acupressure should be used to arrest the bleeding, but I gave the preference to the latter, because, by doing so, I could in twenty-four hours have the satisfaction of seeing all foreign matter removed from the wound.

In the course of three days the wound assumed an inflamed appearance, and, in consequence, I removed the whole of the sutures, applied a single strip of adhesive plaster to prevent the wound from gaping, and employed tepid water dressings very copiously. On the following day I ordered a flour poultice, and in forty-eight hours there was a free discharge of pus. Water dressings, simple or medicated, according to the appearance of the wound, were the subsequent applications. On three following occasions, a small abscess formed on the back of the leg; the bowels were at times loose as before the operation; and the patient at his own urgent desire was allowed to leave the hospital on the 27th of September, as he had a strong impression that his general health was injured by his long confinement. I attended him at his own home until the 1st of November, when the wound was perfectly cicatrized and his general health greatly improved. Some months afterwards he called at my house and also at the hospital to show how well he was, and he stated on each occasion that "the limb was as strong as the other, and that he never was in such excellent health."

The growth is a beautiful specimen of a cartilaginous tumour ; and like all recorded examples of that class near the ends of long bones, with one or two exceptions, it is situated between the walls and the periosteum, and firmly fixed to the bone by out-growths of bone into the tumour, and by prolongations inwards from the periosteum to the bone.

I have now seen in my own experience nine specimens of cartilaginous tumours near the ends of long bones, and they have all been situated between the walls of the bone and the periosteum, and in no instance extended to the cartilage of incrustation at the end of the bone. I have met with fifteen examples in metacarpal bones, and they all originated within the bone, and caused more or less of expansion of the walls and their conversion into a thin crust or shell around the tumour, in various instances at parts completely absorbed. I have seen and carefully examined seven examples of the same kind of growth in the middle of the long bones, and they were all placed within the canal and around the wall of the bone. Judging from my own comparatively limited experience, I would conclude that the favourite site of the first class is around the bone ; of the second within it ; and of the third, both within and around it. The tumour is exceedingly hard, owing partly to the ossification of its base ; the knife cuts the superficial part crisply, and the cut surfaces have a smooth

appearance. The microscopic characters are so like those of fatal cartilage as to render it impossible to say by the microscopic characters to which structure the specimen belongs.

#### CASE XXIII.—EXCISION OF TESTICLE.

##### *Acupressure by First and Fourth Methods.*

John Niven, labourer, aged 44 years, was admitted into Hospital on the 26th of January, 1866, affected with a tumour of the right testicle of many months' duration, and of great size—the greatest circumference being nineteen inches, and the smallest fifteen inches.

On the 31st of January, the patient having been placed upon the operation table, and brought under the influence of chloroform, the cord was raised up between the thumb and forefinger, and a long pin introduced underneath it, for the double purpose of commanding the haemorrhage and preventing retraction of the cord. The pin was supported by a few turns of a twisted suture. As the diseased testicle was so large as to render it impossible, without cutting the partition which separates the testicles, to practise the brilliant operation of Vincent Karn, which I have several times performed, and in which the operator holds the diseased testicle with the left hand, separates it as much as possible from the sound one, and removes at one stroke of a long knife the testicle and the side of the

scrotum by which it is enveloped, I adopted a modification of the method of M. Lisfranc, and the three steps of the operation—the incisions of the integument, the dissection of the testicle, and the section of the cord were quickly performed by a few rapid movements of the bestoury. Two small arteries—the one in the wall of the scrotum near the penis, and the other behind the cord were acupressed by the Fourth method. After all oozing had completely ceased, the edges of the wound were brought into nice apposition by means of a few wire sutures, and the scrotum was kept perfectly horizontal by being placed on a towel folded square as it comes from the laundress, and having tapes at each corner—the two upper being tied to a turn of bandage round the abdomen, and the two lower fixed round the thighs. Two hours and a half after operation the cord and the two arteries were relieved from acupressure, without the appearance of a single drop of blood. In two days the sutures were removed, and the parts maintained in apposition by two strips of isinglass plaster. The wound was dressed with a single long strip of lint about an inch broad, dipped at first in water and afterwards in oil ; and, notwithstanding the great size of the tumour, the wound healed very quickly by primary adhesion.

This is the second case of excision of testicle in which I have acupressed the spermatic cord. In the former, a perfect example of primary union, the cord

was acupressed after excision, and the pin was removed in twenty-four hours; but in this case, acupressure of the cord preceded excision, and the pins were removed in two hours and a half.

CASE XXIV.—AMPUTATION IN UPPER THIRD OF LEG.

*Acupressure by Fourth and Fifth Methods.*

Robert Copland, a blacksmith, 38 years of age, was admitted into hospital on the 27th of March, for the purpose of having amputation performed in the upper third of the leg, on account of medullary cancer of great size, and of most unusual duration, embracing the lower third of the leg and part of the foot. The patient stated very decidedly that the disease was of fourteen years' duration, but, be that as it may, there could be no doubt that the disease was cancer, and that it was the medullary form. The symptoms on admission, the appearances in every part of the disease after amputation, and the microscopic characters were all as indicative of medullary cancer as they possibly could be, notwithstanding the statement of the patient that the disease had existed for a period so far beyond what is usual in any form of cancer, and more particularly in the medullary variety.

The skin over portion of the tumour had given way two years previous to his admission into hospital, and a fungus occupied its place. Frequent haemorrhage from

the fungus, and occasional severe and long-continued attacks of looseness of the bowels had brought the patient into a state of great exhaustion, and given him a very blanched appearance. The patient's exhausted state caused considerable doubt in the minds of my colleagues and myself as to whether or not he would be able to undergo an operation, but after a candid explanation of the great risk, the patient anxiously begged to have his leg removed. Amputation was performed in the upper third of the leg, and four arteries were acupressed—the anterior and posterior tibial by the Fourth method, and the peroneal and a large muscular branch by the Fifth. With the aid of my able colleagues the operation was performed with as little loss of blood as is possible in that amputation, and there was not a drop of oozing after it.

Twenty-four hours after operation, I relieved the anterior tibial artery from acupressure, and it instantly bled as energetically as if it had been that moment cut across. Acupressure pins and loops were in the ward, the House-surgeon and some of the surgical pupils of the hospital were with me at the time, and I immediately got the femoral artery compressed, opened the wound, and acupressed the artery again by the Fourth method. The blood lost did not exceed a dessert spoonful, and the whole proceeding did not occupy more than three or four minutes. This is the only instance in which I had ever seen any haemorrhage

from an artery on its being freed from acupressure, and I attributed its occurrence in this case to the extreme exhaustion of the patient being unfavourable for adhesion. The whole of the pins were removed in other forty-eight hours, without their removal being followed by a single drop of blood. The bowels again became extremely loose on the third day after operation, and, notwithstanding all means used to check them, they continued so until the day previous to his death, which took place on the tenth day after operation, and appeared to be caused by exhaustion. The friends would not allow a post-mortem examination ; but at my anxious desire our late excellent House-surgeon, Dr. Aitken, now of Greenock, made an examination of the state of the arteries, and favoured me with the following report :—

*"MEMORANDA as to condition of arteries in stump of Robert Copland, who died of exhaustion, 14th April, 1866, ten days after amputation of leg (in upper third) for soft cancer of the foot and ankle, of fourteen years' duration. Stump examined twenty-one hours after death.*

"The adhesions which had formed between the flaps were almost completely destroyed, and the whole of the interior of the stump was covered with a superficial slough. About half an inch of the anterior portion of the tibia was bare and dead. The arteries could not

be found upon the face of the stump, and were in consequence traced down from the popliteal. They were all small and empty, and the coats contracted and thickened, especially in the terminal three-quarters of an inch or so of each. The anterior tibial was larger than the posterior even before the latter had given off the peroneal. They were all detached from their sheaths with unusual facility, and the adhesions of the cut extremities to the surrounding tissues were very slight. The posterior tibial and peroneal were only closed by a slight exudation of lymph which had united together the divided extremities in each case; and in the posterior tibial this lymph was so soft as to give way upon very gentle pressure. The anterior tibial was closed by a well formed, firm, doubly-conical plug of decolorized fibrin about three-eighths of an inch long, which was adherent to the walls of the vessel throughout its distal third. The veins accompanying the arteries were natural in appearance, but the blood which they contained appeared to be semi-disorganized."

## CASE XXV.—EXCISION OF MAMMA.

*Acupressure by First, Fourth, and Fifth Methods.*

Isabella Kidd, a rather slender but healthy-looking person, 32 years of age, was admitted into hospital under my care on the 21st of March, 1866, for the

removal of her right mamma, which presented all the characters of fibrous carcinoma in its first stage. The operation was performed in the usual way—four arteries were acupressed, two of them by the First and two by the Fourth method, and the edges of the wound were brought into perfect apposition by metallic sutures supported by strips of isinglass plaster. Three hours after operation the acupressure pins were withdrawn, and on the second day the sutures were removed, but the strips of isinglass plaster were allowed to remain. This case, in my opinion, furnished a perfect example of healing by primary adhesion. When about to leave the hospital this patient became very unwell with what turned out to be an attack of small-pox, and she was transferred to the medical wards. Some time after this patient had left the hospital she came back to show me a small part of the wound where a few drops of pus had formed during her recovery from small-pox.

## CASE XXVI.—EXCISION OF MAMMA.

*Acupressure by First, Fourth, and Fifth Methods.*

Mrs. Peddie, 35 years of age, was admitted into hospital on the 18th of May, 1866, with a large cystic tumour of the breast of four years' duration ; but her health at the time of her admission was not in a satisfactory state for the performance of an operation. On

the 13th of June, I excised the whole of the mamma by the vertical incision, the adoption of that method having been necessary to admit of the edges of the wound being brought into apposition. Five arteries were acupressed—three by the First, one by the Fourth, and one by the Fifth method. The pins were removed in forty-eight hours, and the wound, which was eight inches in length, healed either by immediate union or by primary adhesion. It appeared to me impossible to determine by which of these desirable methods the healing was accomplished.

## CASE XXVII.—EXCISION OF MAMMA.

*Acupressure by Fourth and Fifth Methods.*

Mrs. Hussie, 46 years of age, was admitted into hospital under my care on the 5th of June, and I excised her right mamma on the 13th of June on account of hard cancer. As in the last-mentioned case operated upon in the same day, the method by the vertical incision was necessary to admit of the edges of the wound being brought into apposition. Four vessels were acupressed by the Fourth and one by the Fifth method. The vessels were relieved from acupressure in twenty-two hours, and the wound, seven inches and a half in length, healed either by immediate union or by primary adhesion. It appeared to me as difficult as in the last-mentioned case to determine by which of

the methods healing was accomplished. In these and the great majority of the cases, no appliances or dressings of any kind were employed, except a few metallic sutures and strips of isinglass plaster, as retentive means for preserving the edges of the wound in apposition. One great advantage among others of this method of healing wounds is that patients are saved from all fear of pain in the changing of dressings.

#### CASE XXVIII.—EXCISION OF MAMMA.

*Acupressure by First and Fourth Methods.*

A lady, 45 years of age, somewhat thin, and of a nervous or slight lymphatic constitution, to whom I was called by my esteemed colleague, Professor Mac-robin, has had a hard cancer, of ten years' duration, in her right breast. Four cases of the same variety of cancer of similar unusual duration have occurred in my own experience, but these are purely exceptional cases on which it would be extremely imprudent to found any conclusions. The duration of the disease in this and the four other instances, all which occurred in patients under fifty years of age, struck me the more on account of their being admirable examples of the most common of all species of cancer, namely, that referred to by different authorities under the names of carcinoma fibrosum, hard cancer, or scirrhous. This case was an example of the globular scirrhous of some

authors, and not the form of cancer so admirably described by M. Velpeau, under the name of atrophic scirrhous. It is well known that atrophic scirrhous often progresses very slowly, that women may labour under it for years without suffering much in their general health, that some have survived twelve, fifteen, or twenty years with the atrophic form of scirrhous, and that, although it has been in exceedingly rare cases met with under forty-five years of age, it almost invariably commences at a much more advanced period of life, and hence some have called it the cancer of old women. Some of the special characters of atrophic scirrhous are, that it shrivels up the tissues or the organ affected, that ulceration is long of taking place, that the ulcer may partially or even entirely cicatrize, and another may form ; but that whatever peculiarities there may be with regard to the ulceration, the disease continues to progress, and sooner or later, like all other species of cancer, destroys the patient. In this well-marked example of carcinoma fibrosum, the tumour was exceedingly hard and incompressible, nodulated on its surface, and its size was equal to that of the fist. It had long ceased to be moveable under the skin or upon the surface of the chest. The skin was adherent and incorporated with the tumour to the extent of four inches from above downwards, and to less than half that extent from side to side. It was discoloured where adherent ; and a little above the nipple, which

was greatly retracted, there was a small ulcer about an inch in diameter, having the usual characters of the ulcer in the advanced stage of hard cancer. The tumour could not be moved upon the chest, and, as was seen in the operation, its deep surface was firmly adherent to the ribs and intercostal muscles. It was very evident that after excision by the ordinary method by the oblique or transverse incision the edges of the wound would have remained several inches apart, and I therefore resolved, as in the last two cases, to prefer the method by the vertical incision. It is singular that three cases should have presented themselves in succession for operation, namely, this case and the last two both operated upon in the same day, and all within three weeks, in each of which the method by the vertical incision made it practicable to remove all the parts apparently involved in the disease, and at the same time to have a covering for the wound.

On the 29th of June, I excised the mamma by the vertical method, the wound being seven inches in length from above downwards. The deep surface of the tumour was firmly adherent to the ribs and intercostal muscles. Four arteries bled profusely, but were speedily acupressed—two by the First and two by the Fourth method. With the exception of a small part about an inch in length, the edges of the wound were brought into perfect apposition by means of a few sutures, supported by long and broad strips of isinglass

plaster, which effectually secured perfect rest of parts, and took off all tension from the sutures. In eighteen hours the arteries were relieved from acupressure, without a drop of blood being seen, and on the sixth day, when all the sutures were removed, and the long broad strips of isinglass plaster were changed, the surfaces of the wound were everywhere united, except at a small part about an inch in length from above downwards, and three quarters of an inch from side to side, where the edges of the wound could not be placed in apposition. Over this part a bit of wet lint was placed. A more perfect example of healing either by immediate union or by primary adhesion could not be conceived than took place everywhere throughout this large wound, except at the small bit where the edges could not be brought into apposition. At that part the healing was speedily completed by granulation and cicatrization. The employment of acupressure by admitting of the early removal of every foreign body from the wound no doubt contributed, along with perfect rest of parts, and no dressings beyond the retentive applications and a bit of lint, to the comfort of the patient, and to the satisfactory result.

## CASE XXIX.—AMPUTATION IN LOWER THIRD OF LEG.

*Acupressure by Fourth Method.*

Peter Mitchell, 10 years of age, a poor, friendless,

scrofulous-looking boy, who had been poorly fed and badly clothed, was admitted into hospital on the 18th of May, 1866, on account of caries of the foot and lower part of the tibia, combined with extensive ulcerative destruction of the integument of the heel and outer part of ankle. The left elbow-joint was not in a satisfactory state, and there were various other manifestations of scrofula in different parts of his body. On the 23d of May, I performed amputation in the lower third of the leg, and acupressed five arteries by the Fourth method. The pins and loops were removed in forty-eight hours, without their removal being followed by a drop of blood. Considerable suppuration took place in this case, but in the course of four weeks the wound healed, and the poor boy had a beautiful stump. I kept this patient in the hospital until the 23d of July, for the purpose of feeding him up and improving his general health, when Mr. Grant of Holburn Street, one of the pupils of the hospital, had the kindness, out of compassion to this friendless patient, to send him to a place in the country where he has the benefit of good food, pure air, and kind treatment.

CASE XXX.—AMPUTATION IN UPPER THIRD OF LEG.

*Acupressure by Fourth and Fifth Methods.*

Robert Mitchell, 15 years of age, a farm servant, of a delicate and highly strumous constitution, whose

extreme emaciation displayed all the osseous irregularities of his chest, as if the integuments alone were covering the bones, was brought to the hospital on the 6th of March, 1866, with scrofulous caries of the foot, ankle, and lower part of tibia. The bowels were loose, and the patient's condition was so deplorable in other respects that, for some time, I refused to resort to any surgical operation. By the 23d of May, the patient's general state was a little improved, and as it was evident that death would ensue unless something were done, and having first of all made a candid explanation of the risk of an operation in his exhausted state, at the patient's earnest entreaty, I agreed to remove the limb. Very little blood was lost during operation. The anterior, posterior, and peroneal arteries were speedily acupressed by the Fourth, and two other vessels by the Fifth method. Unfortunately for this patient, the evening after operation was that of the Queen's birth-day, and owing to his nervous state, the frequent discharge of firearms caused great starting of his stump, but although this was a great trial of the efficiency of acupressure, no haemorrhage resulted. Owing to the patient's feeble state I waited until seventy-two hours after operation, when all the vessels were relieved from acupressure, without a drop of blood being seen. On the second day after operation the bowels again became extremely loose, and continued so, more or less, for five days. Profuse suppuration

took place in the wound, the patient was seized with erysipelas, which began above the knee and ended in a large abscess in the popliteal space, which I opened very freely, and allowed the escape of a large quantity of badly conditioned pus. The abscess healed up ; the wound for five weeks continued to discharge a considerable quantity of pus ; but the health, six weeks after operation, was decidedly improved ; suppuration ceased, and the stump eventually healed. The attack of erysipelas had, of course, a most injurious influence ; but there can be no doubt that the unhealthy state of the patient's constitution was the chief cause of all his untoward symptoms.

CASE XXXI.—EXCISION OF EPITHELIOMA—RESTORATION  
OF LOWER LIP.

*Acupressure of Facial Arteries—First Method.*

A widow lady, 62 years of age, was sent to me from a distant part of the country to have an operation performed for the removal of an epithelial cancer and the formation of a new lower lip. Few proceedings in surgery could be more simple than that for effecting the first object—the excision of the epithelial cancer ; but, as the disease not only affected the whole of the lip but extended a little into the cheek on each side, the case was an admirable one for testing the efficiency of any operation for the accomplishment of the second object—the formation of a new lower lip.

Having had considerable experience of the different operations for the attainment of these objects ; and several years ago having arrived at the firm conclusion that, for many cases, the one recommended and so clearly described by Professor Serres of Montpellier, is decidedly the best, I resolved to adopt it in this case. The operation, the principle of which dates back to the days of Celsus, was first described by the late celebrated M. Malguigne, whose work is now before me, first put into practice by the late M. Bonnet of Lyons, and thereafter so successfully practised and clearly described by Professor Serres of Montpellier, as now to be well known as his method. This operation, so far as my reading has enabled me to judge, was first practised in Great Britain in a case in St. Bartholomew's Hospital, by Mr. Lawrence, of whom the Surgeons of these Islands are so justly proud, and in the following week it was performed by me, with the best results, on a patient in the Royal Infirmary of Aberdeen. This method presents the great advantages of forming a lower lip on a level with the incisor teeth, having no tendency to fall down, lined by a mucous membrane, perfectly moveable, sufficiently thick, and well adapted for the performance of all its functions, while at the same time it leaves but slight traces of an operation, and gives a more pleasing and natural expression of countenance than I have seen the result of other operations for the

restoration of the lower lip. As this patient stated she was much accustomed to the endurance of pain, and begged she might not be asked to take chloroform, I was spared the fear of danger from blood passing down into the larynx while the patient was in a state of unconsciousness, and there was no obstacle to my placing her in the most desirable attitude for operation, namely, sitting in the erect position on a high chair, with the back of her head resting against the breast of one of my assistants, who effectually commanded the facial arteries by means of digital compression. The operation was commenced by making two oblique and two horizontal incisions, the oblique beginning beyond the commissures of the lips, meeting each other in the mesial line a little below the chin, and forming together the ancient classical V incision —the horizontal extending through the whole thickness of the cheek on each side from the angle of the mouth to the border of the masseter muscle, below the level of the parotid duct, and in a line with the teeth of the upper jaw. The whole of the soft parts in front of the lower jaw included between the oblique incisions were then removed, and thereafter the flaps bounded by the oblique and horizontal incisions were extensively separated from the subjacent bone so as to admit of their inner edges being brought together at the mesial line. The cutting part of the operation being finished, and the parts implicated in the disease

removed, the next indications were the suppression of the haemorrhage, the bringing together of the inner edges of the flaps, and maintaining them in complete apposition at the mesial line. The means for fulfilling these indications were the use of five fine hare-lip pins and five silk threads for twisted sutures. On taking off the pressure from the facial artery at the base of the jaw the haemorrhage was excessive, and proceeded from the upper edge of the flap where that vessel was unavoidably divided in making the horizontal incision. It was evident that the haemorrhage from the facial artery in the upper edge of the flap could not be suppressed by employing the hare-lip pin in the manner it is often used for checking haemorrhage from the coronary arteries in the ordinary operations on the lip. In the ordinary operations of more limited excision, the pin and the coronary artery both pass horizontally, and the pin is sent into the mouth of the bleeding vessel, which, like the pin, is directed inwards ; but in this operation the direction of the artery was upwards while that of the pin used for keeping the edges of the flaps together required to be horizontal ; and, besides, the mouth of the facial artery was in the upper, whereas the pin required to be passed through the inner edge of the flap. I resolved to check the haemorrhage by compressing both the facial arteries between one of the hare-lip pins and one of the twisted sutures used in bringing into and main-

taining the inner edges of the flaps in apposition, but, as will be seen, the suture was not required for the arresting of the hæmorrhage. With this view I inserted the pin into the left cheek between the artery and the masseter muscle—passed it behind the artery without penetrating the mucous membrane—caused it to emerge on the inner edge of the flap about a quarter of an inch below its upper border, and having two-thirds of the thickness of the edge between the pin and the skin—made the pin enter the inner edge of the right flap so as to make its point of entrance on the right flap to correspond with its point of exit on the left—carried it behind the facial artery and caused it to emerge abruptly between that vessel and the masseter muscle. On pressing the flaps thus trans-fixed inwards by my two forefingers to ascertain, before applying the twisted suture, if the horizontal edges would be precisely on the same level, and on directing the assistant, who commanded the facial arteries, to take off the pressure that I might try if slight pressure with the fingers against the pins would check the hæmorrhage. I was exceedingly gratified to find the hæmorrhage was completely arrested by the pin alone without twisted suture or digital compression. The soft parts in front furnished sufficient resistance to the pin behind and on the masseteric sides of the arteries to acupress both vessels, and thus, without intending it on my part, a beautiful example was furnished of

the first form of acupressure before this method of arresting haemorrhage was suggested by Sir James Y. Simpson, or any name proposed for the proceeding. A twisted suture was then applied, not to arrest the haemorrhage, but to bring the edges of the flap together. By means of this pin and twisted suture and four other pins and twisted sutures, applied in the ordinary way, the inner edges of the flaps were nicely and beautifully brought into, and maintained in, apposition on the mesial plane. The horizontal wounds beyond the upper lip were greatly shortened by the bringing forward of the flaps, and their edges were brought together by two interrupted sutures on each side—one at the part intended for the angle of the mouth, and the other between the angle and the outer extremity of the wound. These interrupt sutures not only served the purpose of retentive appliances for keeping together the edges of the horizontal incisions, but also assisted other means in diminishing the tension on the pins by which the inner edges of the flaps were maintained in apposition. The mucous membrane and skin of the intended lip were then united by four fine sutures, and thereafter the tension was completely taken off the hare-lip pins and twisted sutures by pressing the skin of the cheeks very much forward, and applying long strips of isinglass plaster between the pins and extending farther back than the lower jaw, care being taken to leave the heads of the

pins exposed so that they could be taken hold of, and the pins twisted and withdrawn at the proper time without disturbing the strips of plaster or losing the benefit of their support. The twisted sutures not being formed of a single long thread, but each of a separate bit, allowed the plasters to be applied so as to secure the skin of the two flaps in perfect apposition. A long strip of the same extremely adhesive isinglass plaster was then applied on each side extending from the outer part of the orbit downwards between the two interrupted sutures used in closing the horizontal wound, passing over the transverse strips of isinglass plaster and ending below the chin on the opposite side.

The above-mentioned retentive appliances were the only appliances ever used in this case. The fine sutures used in bringing together the mucous membrane and skin of the new lip were removed in twenty-four hours, three of the hare-lip pins in forty-eight hours, the remaining pins and sutures in ninety-six hours, and the plasters in six days, when all the parts were perfectly healed. The pins and sutures caused no irritation whatever, in consequence of all tension having been removed by the isinglass plaster. The patient was fed on beef-tea and milk for a week by means of a medicine cup, that the parts might be preserved in a state of perfect repose. Notwithstanding the extent of the wounds, and the amount of denudation of the flaps from the subjacent bone, the case

furnished a beautiful example of one or other of the two first modes of healing; but whether it was an example of immediate union or of union by primary adhesion, it was not possible to determine; but this is certain that no medium of union was discoverable, and a single drop of pus or discharge of any kind was never formed. The absence of foreign matter in the wound, the use of acupressure for arresting the haemorrhage, and the complete repose of the parts after operation all contributed to the desired result. The lady never moved her head or made the slightest expression of suffering during operation—kept the parts afterwards at perfect rest as long as desired to

FIG. 32.

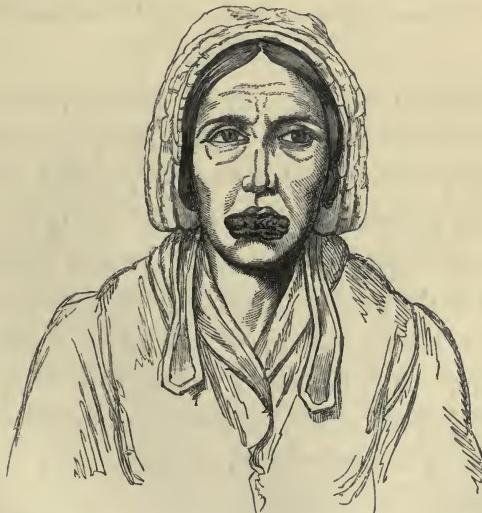


FIG. 32.—Appearance of Patient before operation.

FIG. 33.

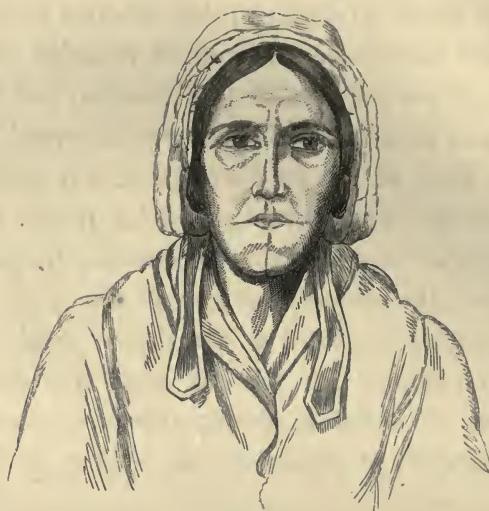


FIG. 33.—Appearance of Patient after the removal of the disease and the restoration of the lower lip.

do so—allowed drawings to be taken by an artist before and after operation, which she pronounced to be perfectly correct ; and she was so gratified with the benefit she experienced, that, although not in the position of an hospital patient, she expressed a desire to meet me at the hospital to give me an opportunity of showing a pleasing example of restoration of the lower lip—a proposal I was happy to accept, as it enabled me, in a clinical lecture, to give to our students the instruction to be derived from this interesting case.

## CASE XXXII.—AMPUTATION OF THIGH.

*Acupressure by Fourth and Fifth Methods—Healing either by immediate union or by primary adhesion.*

At the hospital on the 18th of July, 1866, I performed amputation in the middle third of the right thigh of Alexander Robb, a delicate-looking boy, 6 years of age, on account of extensive disease of his knee-joint, and the condition of his leg. The femoral and other two arteries were acupressed by the Aberdeen method by the Twist, and another vessel was compressed by the Fourth method. The pins were withdrawn in forty-four hours, without being followed by a drop of blood, and the patient said without causing any pain. After operation I thought it necessary to caution the little patient not to touch the acupressure pins, which he called the pins with the beautiful heads, and promised to give them to him after their removal. He took great care not to touch them or to allow any person except myself to do so, and to his great delight sent them home by his father for preservation until his return. It is now nine days since the operation, and this sheet must go to press.

Since the operation this little patient has slept as well as ever he did in his life—has been anxious for his food—has had no uneasy sensation of any kind, either general or local—and been in the highest of spirits. The stump is perfectly healed either by

immediate union or by primary adhesion. The healing must have been by one or other of these processes; and I am inclined to think it must be by the former, as no medium of union is discernible at the edges of the wound. No dressings have been employed or retentive appliances of any kind, except the few sutures and the three strips of isinglass plaster which were applied before the patient was taken from the operation table. The sutures were removed on the fourth day. This little patient has a fine musical ear, and yesterday when I entered the ward with the surgical pupils of the hospital he was whistling most beautifully "The Braes o' Mar," and amusing himself by passing a little model carriage over an inclined plane he had got constructed on his bed. He continued to whistle the above and other airs until it was his turn to be visited.

This is one of the many instances we have lately seen in the Aberdeen hospital of a capital operation and after treatment having been made delightful to the patient as well as to the surgeon. By the aids of chloroform, acupressure, no dressings, and the most perfect immunity attainable from every movement of the stump, many of the hinderances to these gratifying surgical scenes are removed. Since the use of dressings was discontinued in the Aberdeen hospital, patients have looked forward to the visit of their Surgeon as the happiest event of the day, instead of, as formerly, dreading the visit and thankful when it was over.

When wounds go on to suppuration, they, of course, must be treated with dressings according to the usual approved principles of surgery ; but it is extremely gratifying when that and every undesirable grade of inflammation is avoided.

The perusal of the foregoing cases will show that the Third method of acupressure, although perfectly effectual, has very seldom been employed by me of late in comparison of what it was in my earlier cases ; and, indeed, it has been but rarely resorted to by my colleagues or by myself for a considerable number of months. The principle of the Third method is precisely the same as that of the Fourth ; but, as has been fully stated in the section on the different modes of acupressure, the pin of the Fourth method has many advantages over the threaded needle of the Third ; and, in consequence, where either method was practicable, the Fourth has, with rare exceptions, been preferred.

## TABULAR VIEW OF FOREGOING THIRTY-TWO CASES.

The above cases may be tabulated as follows, to show the condition for which acupressure was used, the method employed, the age of the patient, and the length of time the acupressure was continued :—

No.	OPERATION.	Age.	METHOD.	Acupressure discontinued	
				AFTER	24 hours.
1	Amputation of Thigh...	6	Third method .....		
2	Do. ....	13	Fifth, or twist, half-rotation .....	36	"
3	Do. ....	51	Do. quarter-rotation .....	75	"
4	Do. ....	66	Fourth method.....	72	"
5	Do. ....	14	Third method .....	Not Resumed.	
6	Do. ....	15	Fourth method.....	72	"
7	Excision of Mamma.....	42	First and Third methods	48	"
8	Do. ....	35	Third method .....	48	"
9	Excision of Elbow-joint,	22	Third method .....	48	"
10	Do. Testicle.....	21	First method.....	24	"
11	Amputation of Leg.....	28	Fifth method, quarter rotation .....	48	"
12	Wound .....	22	Seventh method .....	24	"
13	Excision of Mamma.....	47	First and Third methods	43	"
14	Amputation of Arm.....	7	Third method .....	15	"
15	Excision of Mamma .....	28	First and Third methods	24	"
16	Do. of Erectile Tumour.....	7	First method.....	24	"
17	Do. of Elbow-joint,	20	Fourth and Fifth methods	24	"
18	Do. Do.	15	Fourth method.....	24	"
19	Wound of Forearm.....	26	First method.....	15	"
20	Hæmorrhage from Sloughing.....	50	First method.....	16	"
21	Wound of Hand.....	37	First method.....	24	"
22	Excision of Head of Fibula .....	17	Third method .....	24	"
23	Do. Testicle.....	44	First and Fourth methods	2½	"
24	Amputation of Leg.....	38	Fourth and Fifth methods	72	"
25	Excision of Mamma.....	32	First, Fourth, and Fifth methods .....	3	"
26	Do. ....	35	First, Fourth, and Fifth methods .....	48	"
27	Do. ....	46	Fourth and Fifth methods	22	"
28	Do. ....	45	First and Fourth methods	18	"
29	Amputation of Leg.....	10	Fourth method.....	48	"
30	Do. ....	15	Fourth and Fifth methods	72	"
31	Excision of Epithelioma and Restoration of Lower Lip.....	62	First method.....	48	"
32	Amputation of Thigh...	6	Fourth and Fifth methods	44	"

My esteemed hospital colleague, Dr. Fiddes, has kindly given me the following tabular view of his cases, from which it will be seen that Dr. Fiddes gives the preference to the Fifth method, but when it cannot be easily put into practice, such as in securing the anterior tibial artery in amputation of the leg, he employs the Fourth method. These two tables, and the one of Dr. Keith's cases in a future part of this work, give a view of the experience of acupressure in the Aberdeen Hospital :—

## TABULAR VIEW OF DR. FIDDES'S CASES.

No.	OPERATION.	Age.	METHOD.	Acupressure discontinued	
				AFTER	
1	Amputation of Thigh...	12	Fifth method.....	48	hours.
2	Do. of Forearm	50	Fifth method.....	72	"
3	Excision of Mamma.....	40	Third method .....	72	"
4	Amputation of Leg.....	6	Fourth and Fifth methods	72	"
5	Do. of Arm.....	19	Fifth method.....	48	"
6	Do. of Leg.....	52	Fourth and Fifth methods	48	"
7	Lacerated Wound of Wrist, Radial se- cured at both ends...		Fourth method.....	48	"
8	Excision of Mamma.....	46	Fourth, Fifth, and Sixth methods .....	48	"
9	Amputation of Forearm	10	Fourth and Fifth methods	72	"
10	Do. of Leg .....	10	Fourth and Fifth methods	72	"

#### APPRECIATION OF ACUPRESSURE.

Having given a brief and necessarily imperfect history of acupressure—described its seven principal methods—endeavoured to give a clear description of the five modes by which the healing of wounds is effected—and having furnished a faithful record of the thirty-two principal cases of acupressure which have occurred in my own experience, it remains for me now only to state in very few words my appreciation of this new method of checking haemorrhage.

The first great point to be determined is whether or not acupressure be a perfectly reliable means of checking surgical haemorrhage. A knowledge of the rationale of its different methods furnishes in itself presumptive evidence that it must be so; and the record alone of the above thirty-two cases, occurring under great diversity of circumstances, and in which one hundred and eight arteries were successfully acupressed—among which may be enumerated the facial, axillary, humeral, radial, ulnar, mammary, spermatic, femoral, peroneal, and anterior and posterior tibial arteries—

affords, in the opinion of the author, conclusive proof of its efficiency. If to this evidence be added the cases of Dr. Keith and of Dr. Fiddes, embracing with my own the whole experience of acupressure at the Aberdeen Hospital since its adoption by us—even without the valuable experience of other surgeons—the question of whether or not acupressure be a reliable method of checking surgical haemorrhage appears to me to be set at rest. That it is a perfectly reliable method, and that it admits of application under great diversity of conditions my belief is as strong as it could well be on any surgical point; and I have a strong impression that every surgeon who gives it a fair trial will assuredly arrive at the same conclusion.

But although the fact that acupressure is a perfectly reliable proceeding may warrant a surgeon to venture upon its use, reliability as to efficiency of itself constitutes no justification of his giving it preference to the ligature, as no surgeon will deny that the ligature is a perfectly reliable means of arresting surgical haemorrhage. An important question to be fairly determined is,—In conditions where acupressure and deligation are equally practicable and reliable, has acupressure advantages which warrant its preference to deligation? My own conviction is that it has, and my belief is grounded on the following considerations:—

First—It is not only the easiest of application,

but the quickest method yet devised for arresting bleeding. That the vessels in a large amputation can be acupressed in a much shorter time than they can be ligatured, I am perfectly satisfied, and in cases where every drop of blood is precious, and especially in those desperate cases, too familiar in the experience of surgeons, where the smallest addition to the quantity of blood unavoidably lost, would certainly be fatal, it appears to me that, to do all that can be done to preserve life, as far as saving blood is concerned, it is the duty of the surgeon, in all suitable operations, to give his patient the benefit of this new proceeding. In this respect I am perfectly satisfied that the use of acupressure is conservative of life.

Second—Another advantage resulting from shortening the time necessary for the arrest of hæmorrhage is the diminution of the risk of the occurrence of suppuration and other distressing results of the higher grades of inflammation in the stump. I have often thought we are too apt to forget that living tissues are resentful of even slight injuries, and that we are not sufficiently careful to use the sponge as seldom and as gently as possible. The risk from frequent touching of the parts must be diminished by thus shortening the time required for the suppression of hæmorrhage.

Third—The use of the ligature is attended with an insuperable obstacle to obtaining perfect examples either of immediate union or union by primary adhe-

sion without the formation of some pus. I have never allowed myself to call any case a perfect example of either of these two methods of healing where a single drop of pus was seen. Neither of these two methods of healing, in this sense, can be perfect in any case where the ligature is used. The immediate effects of the ligature—the changes by which its removal is rendered possible, and its presence acting as a seton in the wound—render more or less suppuration at the points of deligation and in the tracks of the ligatures inevitable. I never saw, in the experience of any surgeon or in my own, where the ligature was used, a perfect example of either of the two desirable methods of healing without any suppuration. I believe such a case never was and never will be seen.

On the other hand, acupressure, if properly performed, and not too long continued, does not cause any condition which must be followed by suppuration ; and I have seen in my own experience and in that of my colleagues many examples of wounds after capital operations where acupressure was used, where healing was effected in some by immediate union, and in others by primary adhesion, without a single drop of pus. Acupressure, no dressings, and perfect repose of the whole of the wound, are invaluable means for the accomplishment of these gratifying results. Acupressure being reliable warrants its use ; and these gratifying results alone seem sufficient to justify its preference

to the ligature. In many cases suppuration is, no doubt, unavoidable, because we often have to perform operations where conditions exist which, in the present state of our knowledge, we believe to be irremediable, and which render suppuration inevitable ; but the just appreciation of acupressure seems to me to be that it has the great advantage of entirely removing one of the obstacles to immediate union and to union by primary adhesion. I believe every surgeon who gives it a fair trial, who treats his wounds in all respects according to the most approved method, and who wishes to arrive at an unprejudiced opinion will most assuredly accord to it that merit.

Fourth—For arriving at a just appreciation of acupressure, one of the most important points to be determined is, the effect of its use on the frequency of pyæmia, which is admitted by all to hold a high place among the causes of death after great operations. It is only by the careful observation and record of a long series of cases that this question can be definitely determined. It will, however, be generally admitted that whatever promotes either immediate union or primary adhesion diminishes, and that whatever induces suppuration increases the risk of the occurrence of pyæmia. Neither immediate union nor primary adhesion ever can take place throughout the whole of a wound, without some suppuration, in any case where the arteries have been ligatured ; but where

they have been acupressed these desirable results are often obtained, and the risk of the occurrence of pyæmia is thereby entirely obviated. Whatever be the alterations that take place in the blood in pyæmia, and whether the morbific matters are absorbed, imbibed, or generated in the blood passing through an unhealthy inflamed tissue, there can be no doubt that, for the occurrence of pyæmia, inflammation of, or having a tendency to assume, a suppurative character, is absolutely necessary. The presence of purulent, irritating, and decomposing materials, and more or less of devitalised tissue at every point of deligation, renders it highly probable that the risk of pyæmia is much greater after ligature than after acupressure.

As yet there has not been a single instance of pyæmia in any case where acupressure has been practised by my hospital colleagues or by myself.

In the forms of acupressure in which the wire is used, namely, the Third, Fourth, and Sixth, if the wire be drawn with unnecessary and improper tightness, and in these methods, especially if the acupressure be continued for an undue length of time, division and strangulation of arterial coats, and suppuration may be made inevitable. I have heard of cases elsewhere of acupressure having been continued for a considerable number of days. In such circumstances the suppuration and other untoward events ought not in

fairness to be regarded as objections to acupressure, but as results of errors in the manner of its performance and the time of its duration. In my experience of acupressure no fact has struck me more than the slight degree of pressure required for the perfect arrest of circulation through an artery, provided the pressure be direct and continuous. It is important to keep this fact impressed upon the mind that unnecessary and injurious constriction may be avoided. As to how early it is safe to relieve arteries from compression, in these early days of acupressure, I believe it is impossible to give perfectly reliable information. The table of my own cases given at page 134, of Dr. Fiddes's at page 135, and of Dr. Keith's in a future part of this work, will show at a glance what has been the practice of the surgeons of Aberdeen on this point. It is unquestionably safe at the periods stated in the tables, but my strong impression is that future experience will show that the acupressure may be with safety removed at much earlier periods than has as yet been ventured upon.

Fifth—Acupressure requires a much briefer sojourn of the foreign body in the wound—it is safer and far less irritating in consequence of the obliterating foreign body being of a metallic and not of a textile nature—and in acupressure that division and strangulation of the arterial coats does not take place which is inevitable in deligation.

Sixth—It is a great comfort to a patient to be assured in a very few hours after an operation that all foreign matter is removed from the wound ; and as far as that goes, that all interference and suffering are at an end. This is a comfort a patient enjoys after acupressure but not after deligation.

Such are the principal reasons for my regarding acupressure as preferable to deligation in certain circumstances in which both are practicable.

Acupressure being unquestionably a reliable method of arresting haemorrhage, and, for reasons above stated, being in many circumstances deserving of preference, an important question remains to be determined, namely—In all cases in which the surgeon has the power of practising either acupressure or deligation should acupressure invariably be preferred ? My opinion is that it ought not. For making clear my beliefs on this important practical point, I beg to refer to the five methods of healing open incised wounds stated in page 56. Wherever healing is to be attempted by either the First or Second methods, acupressure, in my judgment, is most decidedly preferable —wherever by the Third or Fourth methods, acupressure has no advantage over deligation, and the latter ought to be preferred. With regard to the Fifth method of healing, comparatively rare in our species, it need scarcely be attempted in any case where either deligation or acupressure is necessary.

These views may be tabulated as follows :—

The Healing of open Incised Wounds may be accomplished in Five Methods.	The preferable Mode of Arresting Hæmorrhage.
First.—By Immediate Union, or Union by the First Intention, .....	{ Acupressure.
Second.—By Primary Adhesion, or Union by Adhesive Inflammation, .....	{ Acupressure.
Third.—By Granulation, or by the Second Intention, .....	{ Deligation.
Fourth.—By Secondary Adhesion, or the Union of Granulation, or by the Third Intention, .....	{ Deligation.
Fifth.—By Subcrustaceous Cicatrization, or by Scabbing,.....	{ Neither Acupressure nor Deligation ap- plicable under this method of healing.

Being Professor of Surgery in the University of Aberdeen, being one of the Surgeons of the Aberdeen Hospital, being engaged in the private practice of surgery, and it being one of the principal aims, and one of the greatest pleasures, of my life to diffuse an accurate knowledge of surgery, and to excite an enthusiasm for the study of that science, I considered it a duty to give acupressure a fair trial, and to endeavour to form, from personal experience, a just and unprejudiced judgment regarding it. The conclusion at which I have arrived is, that it has many and great advantages over the ligature, and I have therefore resolved, in all suitable cases, to give it the preference—a resolution in the propriety of which two of my excellent hospital colleagues—Dr. Keith and Dr. Fiddes—who have also employed acupressure with most gratifying results, several able surgeons who made visits to our hospital

to see the proceeding, and the whole body of medical students of the University most cordially concur.

I have not been induced to try acupressure in consequence of my operations or those of my Colleagues having been less successful than those of other surgeons ; for I may state, and I do so, not boastingly, but humbly and gratefully, that the statistics of the Aberdeen Hospital will bear comparison with those of any hospital in the United Kingdom. Neither have I been influenced by any prejudice against the ligature, for I have always felt and taught that the application of the ligature by Ambrose Paré to arrest hæmorrhage in amputations and other wounds is the greatest single improvement in the history of surgery ; that it was the greatest of the many benefits that truly great and good man was the instrument of conferring on his fellow-men, and that he might well say—"For the good of mankind, and for the improvement and honour of surgery, I was inspired by God with that good thought." Indeed this was a striking instance of the genius of man having been guided by the providence of God to a practice which has been of incalculable benefit to the human family. Ambrose Paré, of whom the surgeons of France are so justly proud, earnestly implored surgeons to " bid eternal adieu to all hot irons and cauteries used in arresting hæmorrhage " in amputations and other wounds —an advice which the operators of those dark and

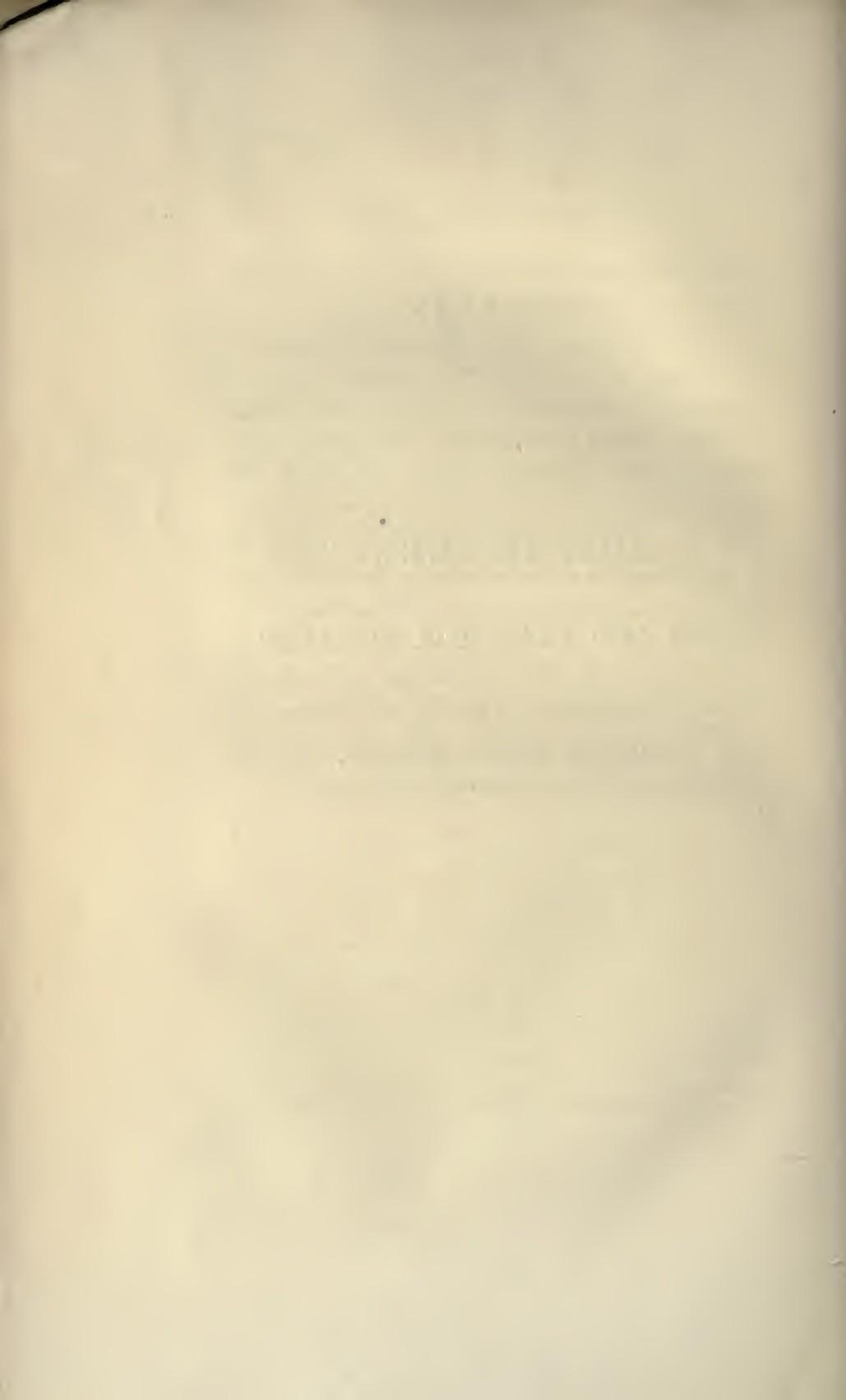
cruel times of surgery were careful not to follow, but, on the contrary, persecuted Ambrose Paré exceedingly on account of his beautiful and simple proposal of using nothing but deligation in amputation wounds. In these later and milder times of surgery, we cannot bid adieu to the ligature, because there are some conditions in which acupressure cannot be used, as there are others in which it is impossible to employ the ligature ; but, while many great operations have such a high rate of mortality in the practice of *all* good surgeons in *all* countries, it seems a duty not "to rest and be thankful," but to receive, and gratefully to adopt, acupressure, in the hope that some of the sources of danger may be modified or entirely removed.

ACUPRESSURE:  
CASES AND PRACTICAL REMARKS.

BY

WILLIAM KEITH, M.R.C.S.E.,

AND SENIOR SURGEON TO THE ABERDEEN ROYAL INFIRMARY.



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## ACUPRESSURE.

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WORKING together in hearty accord, as Professor Pirrie and I have done, to test the merits of Acupressure, in common with our Colleague, Dr. Fiddes, and having arrived at a firm conviction, based on oft-repeated carefully-conducted trials, in every variety of operation, age, and sex, and in all the varied forms of employing needle pressure for the effective arrest of arterial haemorrhage, it would seem but reasonable to give the profession generally (who have not all the opportunities for observation that a hospital affords) the details of our proceedings, and also the ripe conclusions we have arrived at after a very fair and impartial trial.

Professor Pirrie has so ably and so fully, in the body of this volume, given the history, the nature, and the modes of Acupressure, that it remains for me only to add that he and I are at one on the whole subject ; that at the greater number of his cases I was acting as his coadjutor, watched them to their close, and testify to the accuracy of the recorded facts ; and

further to append a short series of cases, with such practical remarks as may throw light on minor details, and aid beginners when making their first attempts at Acupressure.

FIRST METHOD.

FIG. 1.

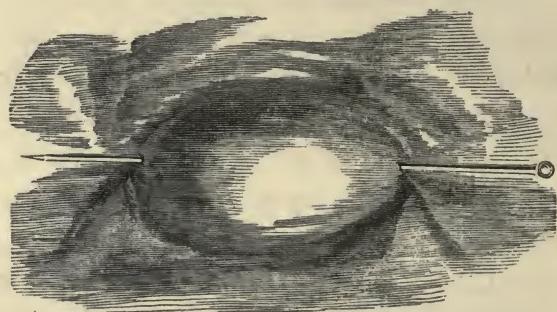


FIG. 1.—Cutaneous surface of a flap, in which an artery is secured by an acupressure pin, according to the First method.

FIG. 2.

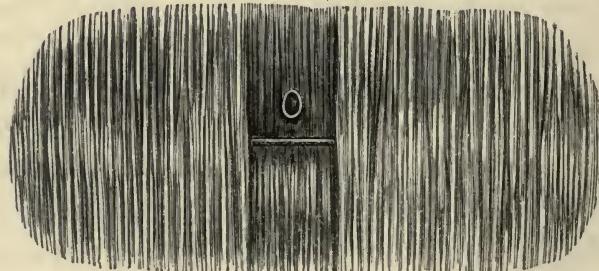


FIG. 2.—Wound surface of the same flap, showing the bridge of the acupressure pin compressing the artery.

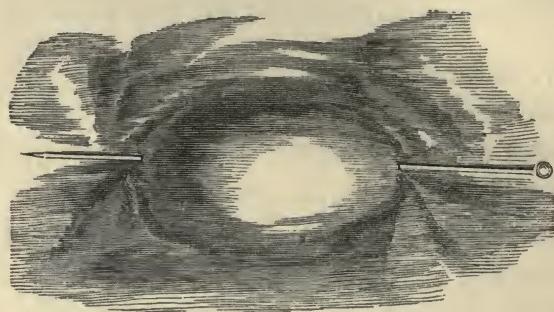
## CASE L.—AMPUTATION OF ARM—CIRCULAR OPERATION.

*Acupressure by First, Third, and Fifth Methods.*

G. W., boilermaker, aged 45, was admitted into the hospital at noon on June 8, 1865, with a crushed and lacerated arm. About ten o'clock the same day, while working at a foundry, he was caught by a belt and carried round a revolving shaft near the ceiling, between which and the shaft he was jammed. The machinery was immediately stopped, and the man extricated. The only injured part was the left arm, which was almost torn through at two places. The flexor muscles of the forearm were severely lacerated, the ulna and radius fractured, and the broken ends of the bones protruded through the tissues. At the elbow there was similar laceration of the soft parts for some distance above and below the joint, and the forearm was completely torn away from the humerus. Amputation by the Circular method was performed about six inches below the acromion process. Six arteries bled. The brachial artery was secured from the outside by Sir James Y. Simpson's First method. The long pin entered through the skin by one side of the artery, passed over the exposed vessel, and immediately made to penetrate outward through the skin. The pressure was sufficient—the arrest complete—the vessel being between the thumb and finger

## FIRST METHOD.

FIG. 3.



all the few seconds required, hindered entirely any loss of blood from it. Two other vessels of some size were secured by the Third method—that of *needle* and *loop*. Three arteries of lesser size were closed by the Fifth, or Aberdeen, method by the *needle-twist*. The wound was closed by wire sutures and the stump left exposed.

June 11.—The stump was very tumid; a livid patch appearing on the front, four needles were removed. Ordered eight ounces of wine.

June 12.—The pin compressing the brachial artery was removed. Not a drop of blood followed the removal of either of the five.

June 14.—All the stitches were removed, the stump was still red, but less tense, and discharging freely.

June 18.—The slough which had formed separated, and was taken away. The sixth pin, the head of which had been concealed and buried for the time by the tumefaction of the stump, was to-day taken away. He continued to improve steadily, and on 15th of July was dismissed cured.

In this case it might have been justifiable to have amputated at the shoulder-joint to escape, as far as possible, from the over-stretched muscles ; but adopting the high circular, reached almost as high a point, and lessened to the patient the gravity of the operation. The slough on front of the deltoid showed how far up the injury extended. One of the bead-headed pins had been drawn in between the lips of the wound by the general expansion of the stump, as it inflamed and tumefied. This must be guarded against with some foresight. Either pins must be employed long enough to protrude freely beyond the limits of the wound, or, if at all short, it is very necessary to twist a wire round the neck of the pin, and leave the wire end hanging loosely outside the wound. When *needles* and not pins are employed in acupressure, it is deemed a necessity in every case to have a twisted wire pendant from the eye of the needle, intended to hang out of the wound, and by which to withdraw the needle when it is wished.

## CASE II.—AMPUTATION OF FOREARM.

*Acupressure by First and Third Methods.*

P. P., seaman, aged 54, afflicted with recurrent fibrous tumor in the palm of his left hand, had the mass dissected out, and its bed, after excision, severely cauterized with chloride of zinc. Two years elapsed after the first operation ere it relapsed, during which period he followed his usual arduous profession with comfort. At his second appearance the tumour had been again growing for three months, and occupied its former site in the hollow of the palm. It was once more dissected deeply out, and again the potential cautery freely used. The wound healed firmly, and he returned home, well. The short interval of three months brought him back in January, 1865, with a tumour not only filling the palm of his hand, but now extending up through the channel, for the flexor tendons, under the anterior annular ligament, into the forearm. In these circumstances no alternative remained but amputation, and it was performed by flap on the 21st day of that month. The radial and ulnar arteries were secured by the First method, one long pin serving to compress both vessels effectually, as represented below.

## FIRST METHOD TWICE REPEATED ON ONE LIMB.

FIG. 4.

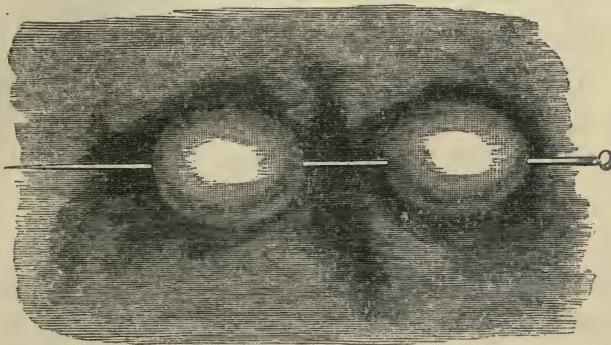


FIG. 4.—Showing 1st, the entry of the long pin through the skin, then under the radial artery, and out again through the skin, traversing the forearm, and again made to enter through the skin on the radial side of the ulnar artery under that vessel, and out again—all as simple as possible, every step taken being visible to the eye.

The interossious artery was secured by the Third mode with a short needle. The pin and needle were removed at the end of fifty-two hours, with not a drop of blood following. Erysipelas, present in the ward at the time, affected the stump for a few days, but did not much retard his recovery, as in four weeks he went home to Shetland, sound and whole. He continues well up to this date (Nov. 1866). From my experience in treating recurrent fibrous tumours, I am convinced that mere evulsion will never do, and that a pretty free ablation by the knife and saw of every tissue for some space round and round is required.

These cases show the facility with which the First method can be practised, and also its efficiency. It is most suitable in flap operations where the bleeding vessel runs some little way under the skin. The writer has used it several times successfully after excising a schirrhous mamma, and found it a great benefit to have a wound clear of all foreign matter. A pin inserted under the superficial femoral artery, according to this method, is most effective, and the same remark applies to the humeral artery after amputation by flap of thigh and upper arm. In practising this mode, there remains one resource not yet pointed out, and that is a valuable one, viz., that with the pin properly placed across the line of the cut artery, and after the limb is done up, should any ooze or haemorrhage offer from the vessel, it can at once and effectually be arrested by slipping a wire loop over the pin point, outside the skin, and loop round its head as if practising the Fourth method, using such an amount of pressure only as the circumstance required. I have never required to loop the pin in the cases where I have practised the First method, the arrest being in every case complete. This method, in common with the Second, the Fifth, or Aberdeen Twist, and the Seventh has the very great advantage of being so easily withdrawn, when its work is done, without incurring the slightest risk of disturbing vessel, clot, or wound. This simple pin pressure is peculiarly appli-

cable in cases where the arteries are found with their coats atheromatous or ossified, as in old age. Few surgeons have escaped the anxieties of watching for days the separation of a silk ligature from a diseased artery. The safety of the pin pressure, according to the Fourth method, was fully illustrated this day week, 2d January, 1867, after amputation as high as the tubercle of the tibia in a case of senile gangrene, performed by Dr. Pirrie. In the situation indicated, the Fourth method was necessarily adopted. The occlusion was easily accomplished with only lateral pressure. At the end of seventy hours the pins were withdrawn, no haemorrhage followed. The wires were allowed other twenty-four hours to loosen, and were then easily taken away. On dissecting the leg downwards, the vessels up to the line of removal were patulous and semi-solid.

## SECOND METHOD.

FIG. 5.

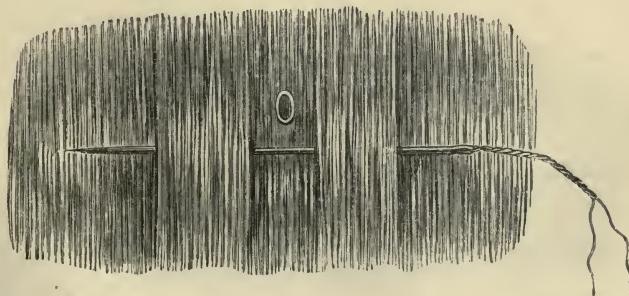


FIG. 5.—Second method, by means of an acupressure needle threaded with iron wire, to admit of its being withdrawn.

It will at once be seen that this is a rather passive kind of pressure, not likely to be effective unless there is a bone behind the artery, and this you do meet with in amputating a leg high up. There I have seen this mode profitably employed in the case of a peroneal artery where the Third and Fourth methods were impracticable ; yet I cannot remember a case in which I have ever practised the Second method, owing to a feeling of uncertainty about it, from the risk attending muscular startings, so usual after operations, disturbing the needle, and also from the circumstance that it is out of sight, and out of reach in case of ooze or bleeding without tearing open the whole wound. It militates also against the adoption of this mode that there are so many others preferable—the Third, the Fourth, the Fifth, but especially the Sixth, which the writer thinks equal to every position however difficult of access.

#### THIRD METHOD.

FIG. 6.

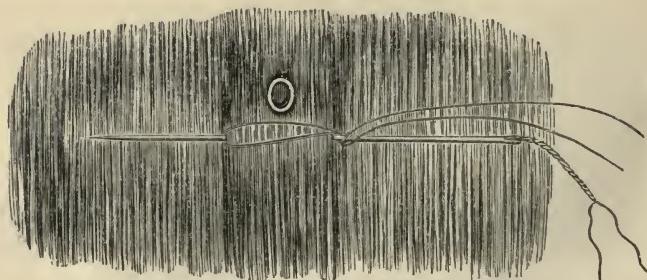


FIG. 6.—The Third method, by means of an acupressure needle threaded with iron wire, and a loop of annealed inelastic wire.

## CASE III.—AMPUTATION OF LEG.

*Acupressure by the Third Method.*

William F., aged 14, had his leg amputated at mid length for diseased ankle-joint, by the flap operation. Three vessels were secured by the Third method. The wound was closed by wire sutures, and left exposed under a wire cradle to the air. Two of the needles were withdrawn at the end of forty-eight hours, and the third at the end of seventy-two, not one drop of blood followed then or after. The stitches were taken out on the fourth day, when the wound was found firmly united by first intention—a new thing in one's experience. The flap in its various forms is preferred by the Aberdeen Surgeons to circular amputation in both upper and lower extremities; and certainly if acupressure is to take the place we think it entitled to, it will be found that the flap mode affords the greatest possible facility for practising that mode of arresting haemorrhage. Taking the flap containing the principal arteries between the thumb and fingers of the left hand, you at once control the haemorrhage, and expose the line of the vessel requiring occlusion. In the above case, a needle with a twisted wire dependent from its eye was passed under each artery a full quarter inch above its cut mouth, a wire loop then placed over the point of the needle was secured by a

half turn under and around the eye end of the needle, thus compressing the artery against the stem of the needle. One point here requires notice in addition to Professor Pirrie's warning not to tighten the wire too much on the artery, and it is not to secure the wire too fast around the needle or pin—a half turn of annealed wire is sufficient to keep up compression for all the time required, and it must be remembered that first the needle and then the wire have to be withdrawn, at the end of forty-eight hours at farthest, without displacement or disturbance of adjoining tissues, more especially of the artery embraced in this very clasp. There must be no twisting of the wire round and round the pin or needle by way of making all very secure. They would get gummed together, and no twirling would loosen their connexion—delegation would have been effected, not acupressure ; and then needle and wire must in such a case remain until the old process of separation by sloughing shall have taken place, unless, indeed, the very disturbing process of unwinding all the twists were adopted to free the pin, at some considerable risk of haemorrhage.

#### CASE IV.—AMPUTATION OF THIGH.

##### *Acupressure by the Third and Fourth Methods.*

Mrs. M., aged 29, had laboured under disease of the knee-joint for three years, and was consequently

much emaciated. On the 16th of November, 1864, amputation was performed at the middle of the thigh by the flap operation. Four large arteries were compressed by long pins and wire loops, and two muscular branches by small needles and loops. The wound closed by wire stitches and left exposed. Seventy-two hours after, the two small needles were removed. At the end of other twenty-four hours, three of the long pins were withdrawn ; and, lastly, the long pin controlling the femoral artery was taken away one hundred and twenty hours after the operation. Not a drop of blood followed the removal of any of the pins. The wire sutures, causing no irritation, were not removed till December the 4th, eighteen days after insertion, by which time the wound was quite healed, and the patient able to be up and moving about. It may add interest to this case to state that on this occasion, for the first time, silk ligatures were not laid out, and acupressure was put publicly on its trial at the Royal Infirmary, Aberdeen. The record shows how cautiously the trial was carried through. The issue was so satisfactory and conclusive that the Surgeons previously named and myself have ever since given acupressure the place in practice it seems to deserve.

## FOURTH METHOD.

FIG. 7.

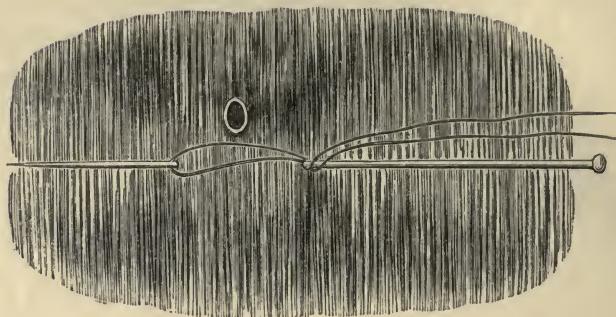


FIG. 7.—The Fourth method of acupressure, by means of a long pin and a loop of iron wire.

The difference between the Third and Fourth methods may seem to some to be trifling, yet each has advantages of its own sufficient to entitle it to distinct and separate recognition. On behalf of the Third, where the needle and pendent wire is employed, it may be stated that, after amputation of a thigh, following long existing disease in a knee-joint, the number of bleeding arteries will at times amount to seven to nine to eleven. In such a case the short pins bedded in their sites, and the flexible wires yielding to be laid out at the two angles of the stump, are much more accommodating than eleven long pins would be, allowing, without hinderance, the full closure of the lips of the wound.

At same time, in the case of a primary amputation, where the number of bleeding vessels requiring arrest are few, the pin is an effective instrument. It is more easily inserted than the short needle, it is more firmly held when looping over, and when giving the securing half-twist to the wire; and when the time comes to withdraw it, one has the opportunity of giving such a twirl to the pin as will loosen any gummy adhesion formed between the pin and the loop, and so withdraw it with the least possible drag or disturbance. Not so always with the needles. You have the end wire attached to the needle, but all you can do is to pull. If the wire has been trained to the surface in a fair line from the needle, the pull may fetch it out; but as the wires have often to be brought out obliquely so as to be led out at the angles of the wound, a kink may form on the wire, a kink does often form, and then the process of removal proves painful to the patient and troublesome to the surgeon, yet the writer never once saw haemorrhage result. He does, however, in practice give a decided preference to the Fourth method with the pin.

## CASE V.—AMPUTATION OF LEG.—FLAP OPERATION.

*Acupressure by Fourth Method.*

Lauchlin G., aged 18, a railway porter, had his left foot crushed to pulp by the wheels of a loaded waggon

having passed over it while lying on the metal rail. This happened at one, p.m., on the 24th of January, 1865. He was brought a distance of thirty-six miles, and arrived at the Royal Infirmary, Aberdeen, at eight o'clock the same night in a very exhausted condition from loss of blood, cold, and fatigue. By adequate means, reaction was fairly established by the end of sixteen hours after his admission, and at twelve, noon, on the 25th of January the leg was amputated a little below mid-length. Four arteries required acupressure, and Sir J. Y. Simpson's Fourth method by pins and wire loops was employed in all the four. The wound was closed by wire sutures. No retraction whatever took place in the gastrocnemius and soleus muscles when they were cut, leaving little doubt but that great molecular injury had been inflicted on the tissues composing the flaps. The stump was, therefore, at once buried in a warm cataplasm, and that to be continued.

January 26.—Stump a little swollen and red, the swelling extending up the thigh. The patient otherwise as well as could be expected. Continue warm poultice and nourishing soups.

January 27.—Stump and thigh considerably swollen. The four pins were to-day removed, forty-eight hours after insertion, and not a drop of blood followed. The patient's state, on the whole, satisfactory; but the pulse is to-day more frequent than hitherto.

January 28—Twelve, noon.—The stump looks well ; the swelling much reduced ; the patient's condition much as yesterday.

At eight, p.m.—He had a severe rigor, followed by great prostration of strength ; pulse scarcely to be counted ; intense thirst ; and in a state of approaching coma. Mustard cataplasms applied to the neck and spine, and wine freely administered.

January 29—Eight, a.m.—Patient sensibly improved. Takes sustenance and wine freely, but feels very faint, and inclines to drowse ; applied a blister to the nape of his neck.

January 30.—To-day he is clear in his intellect ; takes food and wine, but complains of a feeling of faintness amounting to sinking.

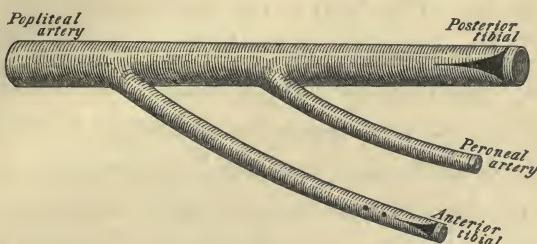
January 31.—In spite of untiring efforts to sustain him he sank at half-past eleven, a.m., this day—six days after the operation.

*Inspection of the body twenty-four hours after death* revealed the evidence of extensive phlebitis in the saphena major vein of the injured limb. The coats of the vessel were thickened, and it was filled with a white thin creamy-looking fluid, not even tinged with blood. The deep-seated veins were all sound and healthy. The kidneys were greatly injected and friable. *The stump was made the subject of very careful dissection.* The flaps were easily separated ; no coagulum was in the wound ; one red stain, the

size of a fourpenny piece, tinged the flesh at the end of the posterior tibial artery, and that seemed all the effusion of blood that had followed the closing up of the wound. The mouths of the anterior tibial, the peroneal, and the posterior tibial arteries lay open to view. Their ends were abrupt, solid-looking, not much retracted, nor in any marked degree contracted, but filled up by organized fibrine or lymph, as solid to the look, and almost as much so to the feel, as the coats of the vessel. The popliteal artery was dissected out along with the above-named vessels, and showed on trial as perfect occlusion at the cut ends as was ever witnessed. On slitting these vessels open from above downwards, the following observations were made :—The peroneal artery was firmly plugged at its cut end for one-fourth of an inch by a colourless fibrous-like tissue indissolubly united to the lining arterial coat. No conical continuation of the plug extended up that vessel. The anterior tibial was in like manner completely occluded. The vessel, when slit up, revealed a short conical continuation of fibrine pointing upwards, its further progress having no doubt been hindered by two small branches in close proximity passing off from the main vessel just above the tip of the clot. The posterior tibial was very effectually closed by a well-plugged mouth, and inside by a conical extension of the plug upwards to fully half an inch, the tissue composing it slightly tinged with

blood, the plug and the cone being one and the same mass.

FIG. 8.



The vasa vasorum had evidently maintained the vitality of the arterial coats, so as, at once, to commence the vital and healing process of exudation of lymph at the cut ends all the more readily that the cellular attachments around the vessels had never been disturbed.

A brief quotation here from Jones's work on "*The Process employed by Nature for the Suppression of Arterial Haemorrhage*," Section iii., page 54, will throw some light on the good service likely to be rendered by acupressure.

"A coagulum then, formed at the mouth of the artery, and within its sheath, and which I have distinguished in the experiments by the name of the *external coagulum*, presents the first complete barrier to the effusion of blood. The coagulum, viewed ex-

ternally, appears like a continuation of the artery, but on cutting open the artery, its termination can be distinctly seen with the coagulum completely shutting its mouth, and enclosed in its sheath.

"The mouth of the artery being no longer pervious, nor a collateral branch very near it, the blood just within it is at rest, coagulates, and forms, in general, a slender conical coagulum, which neither fills up the canal of the artery, nor adheres to its sides, except by a small portion of the circumference of its base, which lies near the extremity of the vessel. This coagulum is distinct from the former, and I have called it the *internal coagulum*.

"In the meantime, the cut extremity of the artery inflames, the *vasa vasorum* pour out lymph, which is prevented from escaping by the external coagulum. This lymph fills up the extremity of the artery, is situated between the internal and external coagula of blood, is somewhat intermingled with them, or adheres to them, and is firmly united all round to the internal coat of the artery.

"The permanent suppression of the haemorrhage chiefly depends on this coagulum of lymph; but while it is forming within, the extremity of the artery is further secured by a gradual contraction which it undergoes, and by an effusion of lymph between its tunics, and into the cellular membrane surrounding it, in consequence of which these parts become thickened,

and so completely incorporated with each other, that it is impossible to distinguish one from the other ; thus not only is the canal of the artery obliterated, but its extremity also is completely effaced, and blended with the surrounding parts. . . . . From this view of the subject we can no longer consider the suppression of haemorrhage as a simple or mere mechanical effect, but as a process performed by the concurrent and successive operations of many causes. These may briefly be stated to consist in the retraction and contraction of the artery, the formation of a coagulum at its mouth, the inflammation and consolidation of its extremity by an effusion of coagulating lymph within its canal, between its tunics and in the cellular substance surrounding it."

By the pin pressure across the cut artery lying undisturbed, somewhat retracted within its sheath, haemorrhage is at once arrested, no *external coagulum* can form, and no external coagulum is needed ; it is therefore well dispensed with, as space is free in the mouth of the cut vessel to receive at once the lymph exuded by the cut vasa vasorum, its escape to any distance being sufficiently hindered by the efficient closure of the wound, the lymph as effused coagulating, becomes at once adherent to a living artery—not a portion so strangulated that it must die —so that forty-eight hours for certain is sufficient to

permanently seal up any ordinary-sized artery. The *internal coagulum*, as may be seen in the diagram, was found in its place, as might reasonably be expected, aiding undoubtedly as a breakwater in lessening the force of the cardiac impulse against the recently sealed-up vessel.

Can any thing prove more clearly the sufficiency of acupressure to arrest arterial haemorrhage while the needful pressure comes short of strangulation—allowing exudation to go on, prior to removing the pins, for any period chosen by the operator—regulated by the vigour or exhausted condition of the patient—the average period adopted by the Aberdeen Surgeons being at present forty-eight hours. Then follows the great facility of at once and safely withdrawing from the wound all foreign matters—pins and wires—this of itself constitutes a strong claim to preference over the silk ligature, always so irregular in its separation, not to speak of the ulceration of coats and separation of the sphacelated end of the strangulated artery when the thread is employed. I testify that the whole vessels in a stump can be as promptly secured by any and all the modes of acupressure as by spring forceps and silk ligature. They can be as firmly secured, and, while inflicting no injury to any living tissue, the pins are at the operator's disposal to leave in or withdraw at his own pleasure; and thus the permanency of the occlusion of the artery is ensured.

## CASE VI.—AMPUTATION OF THIGH—FLAP OPERATION.

*Acupressure by the Fourth Method.*

George R., aged 12, from Newhills, was admitted into hospital on 6th March, 1865. He labours under necrosis of the tibia in his right leg, extensive abscess of the thigh surrounding the knee-joint, and diagnosed to communicate with the joint ; the boy greatly reduced in flesh and strength ; the collections of pus were, one after another, freely emptied by incisions, and his strength recruited as much as possible by rest and generous diet, but it was the 3rd of May before matters were quiet enough about the limb to admit of amputation with any chance of success.

At twelve noon of May 3 the limb was removed at mid thigh, under chloroform, and five arteries were speedily pinned under, and looped over by a wire loop—in other words, they were all secured by Simpson's Fourth mode. The wound was closed by wire stitches—no dressing applied—not an ooze has followed the closure of the wound. The pin-heads varied in colour, so that each vessel was individualized by this protruding pin-head, while the length of each pin selected was regulated by the distance of the artery from the margin or nearest angle of the wound, the pin-head visible outside, the free point for steadiness being stuck into any adjoining muscle. At four p.m. not a

drop of blood had exuded from the wound, although, as was then discovered, he had withdrawn three of the pins, and one of those being the one securing the femoral artery.

May 5.—Wound adherent throughout ; not an ooze of blood from the wound, or even serum ; boy in good spirits : to have meat diet and four ounces of wine daily.

May 7.—The remaining pins were removed to-day. A drop of pus followed the withdrawal of both the pins, but not a tinge of blood. He had headache yesterday, which was speedily removed by free action of the bowels.

May 8.—Going on favourably, but very weak : to be allowed six ounces of wine daily.

May 18.—Last stitches removed yesterday ; wound united, with a trifling amount of suppuration.

May 24.—Stump quite whole ; boy is up every day. To recruit his wasted frame, he was detained in hospital, however, until the 20th of June.

In this case it will be noticed that an occurrence more instructive than desirable happened about four hours after the operation. The restless boy, amusing himself with the pin-heads protruding at the angles of the wound, had withdrawn three of them, yet still no haemorrhage took place. No substitute was applied—merely a nurse set to watch, and all did well. It would, therefore, appear that four hours pressure would

suffice, the parts being kept at rest meanwhile to perfect coagulation sufficiently to shut an artery ; for the femoral artery was one of those relieved of its compressing pin. No one will, I presume, advocate such an early removal of a useful means of support and control, yet the fact affords great support to the opinion, that, at the end of forty-eight hours, the needles and wire loops may be safely and confidently removed.

## CASE VII.—AMPUTATION OF THIGH—FLAP OPERATION.

*Acupressure by the Third and Fourth Methods.*

Mary Murdoch, aged 29, farm servant, came under treatment with the right knee-joint quite disorganized, abscesses burrowing half way up the thigh and around the joint communicating with it. Has been afflicted with the knee-joint for six years, but has been broken down and bedfast for six months past. Admitted on the 17th October. She was fed up until the 16th November, 1866, when amputation was performed at mid-thigh, she being under chloroform. Six arteries required arrest—two were compressed by needle and loop, the Third mode, and other four by long pin and loop. The wound closed with wire sutures was left exposed.

November 17.—Scarcely an ooze from the wound.

The patient is, however, in a most exhausted condition from her previous illness. Brandy in oft-repeated doses has been administered ever since the operation.

November 18.—Beginning to rally ; stimulants freely given.

November 20.—Still improving. To-day withdrew the two needles and their loops, no haemorrhage following.

November 21.—Appetite more natural ; strength improving. Withdrew three of the pins and their loops, not a drop of blood after.

November 22.—Removed the fourth pin and loop—that controlling the femoral artery ; not an ooze of blood ; all well.

November 27.—Required a few ten-grain doses of Tannin for Diarrhoea, otherwise doing well.

December 1.—All right. She remained to recruit until the 24th of December, and went home ; healed up twenty days before dismissal.

The extreme weakness of this patient offered no barrier in the way of adopting acupressure.

#### CASE VIII.—AMPUTATION OF ARM—FLAP OPERATION.

##### *Acupressure by Fourth and Fifth Methods.*

John G., labourer, aged 29, was admitted July 6, 1865, with a crushed elbow-joint. About an hour previously while carrying a large stone on his back,

his shirt collar became so tightened about his neck, in consequence of the stone dragging it down, that he fell

## FIFTH METHOD.

FIG. 9.

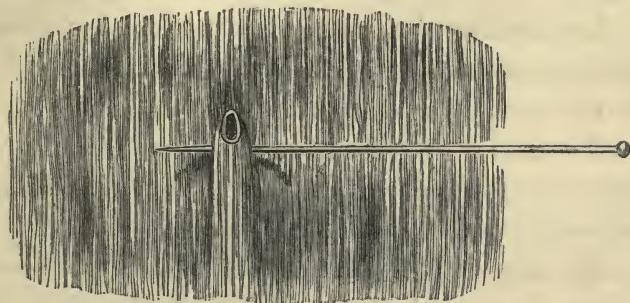


FIG. 9.—Diagram showing the appearance of the parts at the termination of the first step of the Fifth, or Aberdeen, method by the Twist, before making the half rotation with the pin.

FIG. 10.

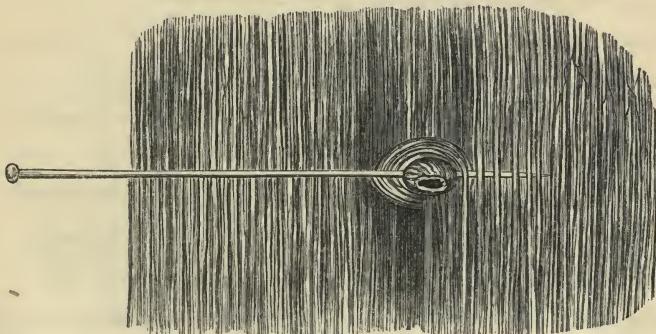


FIG. 10.—Fifth, or Aberdeen, method, with a half rotation of the pin. The Diagram shows the appearance of the parts after the half rotation, and the ultimate insertion of the pin point in the tissues beyond the artery.

down in a state of insensibility, and the stone fell unchecked on his left elbow. The joint was so crushed that amputation by the flap operation, about nine inches below the acromion process, was at once resorted to. Four arteries were acupressed—the brachial by the Fourth method, pin and loop, and other three by the Aberdeen twist. The stump was left exposed ; no blood oozed from the wound. On the 8th, one needle was removed without one drop of blood appearing. On the 9th, two other needles were withdrawn, followed by three drops of blood. On the 10th, all the stitches were removed ; and on the 11th, the pin controlling the brachial artery, with the loss of two drops of blood, no doubt from the surface of some granulation abraded by the pin in its passage out. The suppuration in the wound was very trifling. On the 3d of August he was dismissed sound and well.

#### CASE IX.—EXCISION OF LARGE ADIPOSE TUMOUR.

##### *Acupressure by Fifth Method.*

Mrs. I., aged 47, presented on 15th October, 1866, with an adipose tumour on the left loin measuring twelve inches in diameter, extending from the crest of the ilium upwards. It had been growing four years. On the 16th, it was removed by a simple longitudinal incision. Two arteries bled fiercely from the centre of the wound, being each as large as a radial. As the

dissection was somewhat extensive, the mouths of both were closed by two of Diffenbach's artery forceps until the tumour (subsequently found to weigh two pounds ten and a half ounces) was cleared out. The two vessels referred to were the only nutrient vessels present, and these were secured by two pins, according to the half twist method—a pin being laid out at each angle of the wound.

October 18.—The pins were withdrawn, not a drop of blood following. The wound closed rapidly, and she travelled to a distant home, without inconvenience, on the 3d of November, quite well.

CASE X.—AMPUTATION AT THE SHOULDER-JOINT FOR MEDULLARY DISEASE OF TWENTY MONTHS' GROWTH—FLAP OPERATION.

*Acupressure by Fourth and Fifth Methods.*

William Walker, aged 15, applied in December, 1865, with a painful enlargement of the left humerus, accompanied by complete paralysis of the arm from the shoulder downwards. He states that, about twenty months before, a companion gave him a smart knock with his knuckle on the left arm immediately above the external condyle. The blow pained him much at the moment, and the pain never altogether ceased—though dull, it was ever present. At the end of four months, the injured bone began manifestly to expand,

and the pain to assume a greatly aggravated character. The skin also showed a web of blue veins coursing under it. At the end of eighteen months the arm came to measure thirteen inches in circumference, as compared with eight in the other arm. As the only sure mode of removing the local disease, amputation was, therefore, performed at the shoulder-joint on the 12th of December. From the long presence of disease, the vessels were largely distended, so that six required to be secured. The open mouth of the axillary artery was first seized by an assistant with a simple forceps, and held steady until the pin was passed under the vessel, and the wire loop over it, and secured according to the Fourth method; a second vessel was secured in like manner; the remaining four vessels by the Aberdeen twist, or Fifth method. The advantage derived from an assistant steadyng the cut end of the axillary artery was very observable, and should in large vessels be invariably practised. The four pins secured by the twist were removed at the end of forty-eight hours. The two pins with wire loops were removed at the end of ninety-six hours, with the escape of one drop of blood. The wound healed entirely by first intention. The stump resulting was more comfortable to the patient and comely to look at than usual from the prominent portion of the acromion process having been removed by the saw at the operation.

## CASE XI.—AMPUTATION OF LEG—FLAP OPERATION.

*Acupressure by the Fifth, or Aberdeen, Method.*

Alexander Ross, aged 63, blacksmith, native of Aberdeen, arrived from Newcastle, and was admitted on 6th August, 1865, with one foot crushed to pulp by the wheel of a heavy waggon having passed over it. He states that on the 14th day of July he was taken to the Newcastle Infirmary on the occurrence of the injury. The surgeons decided on immediate amputation of the foot. To this the patient objected, and after procrastinating for nearly three weeks, and still refusing to comply with the wish of the surgeons, he left the Newcastle hospital, and came on by sea to Aberdeen. The man was in a most debilitated condition—the toes all gone, the metatarsal bones all shattered, and the sole of the foot in a state of gangrene. After much care and feeding it was deemed safe to amputate at mid-leg on the 27th September. Three arteries were secured by the Aberdeen twist, or Fifth method. The wound closed by wire sutures.

September 29.—Forty-eight hours after the operation the three pins were withdrawn, not one drop of blood following. Wound at one angle already suppurating, but the greater portion of the wound is firmly adherent. The powers of life in this patient subsequently failed so much that a slough formed around the spine of the tibia, the mouth became

aphthous, and hiccup set in ; but he rallied, weathered through, and is at this time, December 1866, an active book-canvasser. For all the feeble powers of the system at the time of the operation, and all the exhaustion subsequently accompanied by sloughing, not one drop of haemorrhage occurred.

It is to be noted that, in this case, the simple pin twisted was the only means employed for securing each of the three arteries. The method has much to commend it :—

First.—The speed with which it can be effected—Strike into the tissue alongside the mouth of the cut vessel ; wheel round the pin, held flat on the face of the stump all the time until a half or a quarter circle has been traversed, according to the large or small size of the vessel involved, or the pleasure of the operator, then press on the pin point into the flesh beyond to steady the pin and hold the twist secure.

Secondly.—If one is in any doubt about the completeness of the arrest of haemorrhage—it is so easy—so instantaneous a proceeding, as compared with undoing a ligature or a looped needle even—and to strike in the pin again still deeper give the twist and lodge the point.

Thirdly.—When its work is done, and the period for the removal of the pin has come, it meets no hinderance, but comes away like thought, which cannot always be promised for looped pins, as sometimes

the loop adheres rather tenaciously to the pin from too tight twisting, or from gumming of the wire and pin to each other by the animal secretions, and there is always the wire loop to bring away from the wound, at times giving a sting to the patient that is never inflicted by the Aberdeen twist.

In practising the Fifth method the long pin has a great advantage over a short needle—and short it is meant to be, when employed,—to have it buried in the depths of the wound. The leverage is useful, and not only the power but the precision in making the various movements is greater, and then comes the ease of withdrawal at the end. In vessels of magnitude the half and not the quarter twist is, I may say, invariably practised.

#### SIXTH METHOD.

FIG. 11.

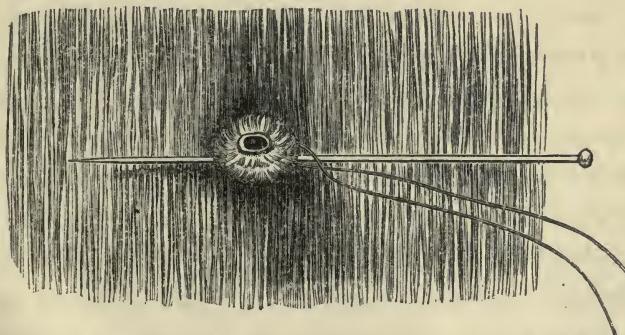


FIG. 11.—Showing the Sixth method, by means of a pin and loop of iron wire.

FIG. 12.



FIG. 12.—Skeleton diagram showing the arrangement of the wire in the Sixth method.

CASE XII.—DEEP PERINEAL WOUND FOR PROSTATIC ABSCESS.

*Acupressure by the Sixth Method.*

Mr. C., aged 45, of a plethoric habit of body and stout make, had driven his own carriage a distance of fifteen miles in a drenching rain, had got thoroughly chilled and wet through. In this state he drove home again, and was immediately after laid up with high fever, which continued for several days. Pain on micturition, and at length retention of urine, called attention to the perineum, where appearances indicated the presence of a deep abscess around the prostate gland, which had also been inaugurated by severe rigors. On being called to the case, the first thing required was to give vent to the pus, and this was at once done by a free and deep incision, the same as practised in Lateral Lithotomy, the plunge with the bistoury reaching the matter at the first dig. The relief was great and immediate, a cupful of ripe pus escaping by the wound, but along with the pus came

a flow of arterial blood too copious to trifle with. When the contents of the abscess were syringed and pressed out, and the lips of the wound forcibly separated, the source of haemorrhage was seen to be deep on the lateral aspect of the wound, much in the site of the transverse artery of the perineum, but large for that vessel. A long pin was passed by the side of the bleeding mouth, well inserted into the adjoining tissue, and out a little way beyond the vessel. An open wire loop was then passed down and over the pin point, the free ends of the wire were crossed behind the pin head and shank, and run home tight on the vessel and tissue enclosed in the loop along with it. The haemorrhage ceased in a moment. One twist of the free ends of the wire over or around the pin-stalk alike secured the pin in its place and the loop grip from relaxing. At the end of fifty-two hours the pin was withdrawn, the loop thereby loosened, and the object accomplished. The case did well. By this mode of acupressure vessels *at any depth* in an open wound can be reached and secured, a quality that does not attach to any of the other six methods, and still less to a silk ligature with either forceps or tenaculum. In a case where the artery of the bulb was wounded in the operation of lithotomy in my presence, by the Surgeon using a broad-bladed gorget knife, the haemorrhage, which was most profuse, was at once arrested by this mode of procedure ; and in a lacerated wound of the deep

palmer arch, occasioned by the explosion of a powder-flask in the patient's hand, the bleeding was at once and effectually arrested by this Sixth mode of acupressure, and the hand did well.

The Sixth method seems to the writer to be applicable in all circumstances, and to any case, and, accordingly, it frequently happens at amputations, when vessels are cut too short off for the Fourth or Fifth methods, or when lodged deep between bones, or where two or three bleeding points offer in near proximity to each other, or, in short, when the other methods seem likely to fail, the long pin is run deep into the tissues so as to enable the ring-like loop to enclose the bleeding point or points at once, and the end is promptly accomplished, and that without fail. No doubt care must be taken not to tighten the wire so much as to produce destructive deligation ; but this caution applies equally to the other methods where wire pressure is brought into play. The one objection to this method is that the wire loop is rather wide spread when it comes to be drawn out of a closed wound, as to that extent it must separate surfaces already adherent. To obviate this evil, the writer employs Turner's finest wire, so pliant that the ring loop readily elongates, and comes out with all the ease attending the drawing out of the loops formed in the Third and Fourth methods. The writer has himself practised the Sixth method thirty or forty times, and has seen his colleagues re-

peatedly employ it for one or more of the arteries after an amputation ; but not on one occasion has it failed in its object to arrest the hæmorrhage effectually and permanently, and never once has there come more than two drops of blood away at or after the removal of the pin and loop, and that is the usual appearance at the removal of even a silk thread from any deep wound.

## SEVENTH METHOD.

FIG. 13.

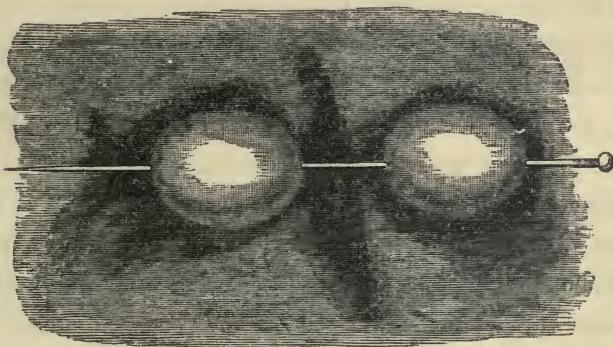


FIG. 13.—Showing the position of the pin in the Seventh method. The middle portion in front of the integument bridges over the artery to be acupressed, and the compression is effected between the middle portion of the pin in front and the bone behind.

It will be noticed that the above is virtually the same as the Second method, already referred to, merely applied outside the skin. The writer has never practised the Seventh method or seen it employed except in the one case under the care of Dr. Fiddes, (detailed

by Dr. Pirrie as Case xii. of his paper, see page 79), and another where secondary haemorrhage occurred in a thigh stump from sloughing after use of silk ligatures, in which the femoral artery was effectually controlled by a long pin inserted a few inches below the groin, according to this Seventh mode. The case did well, no further haemorrhage having taken place, neither was it necessary to open up the wound, so that there would seem to be a place for the Seventh mode, in the practice of acupressure, not to be despised, especially in emergencies.

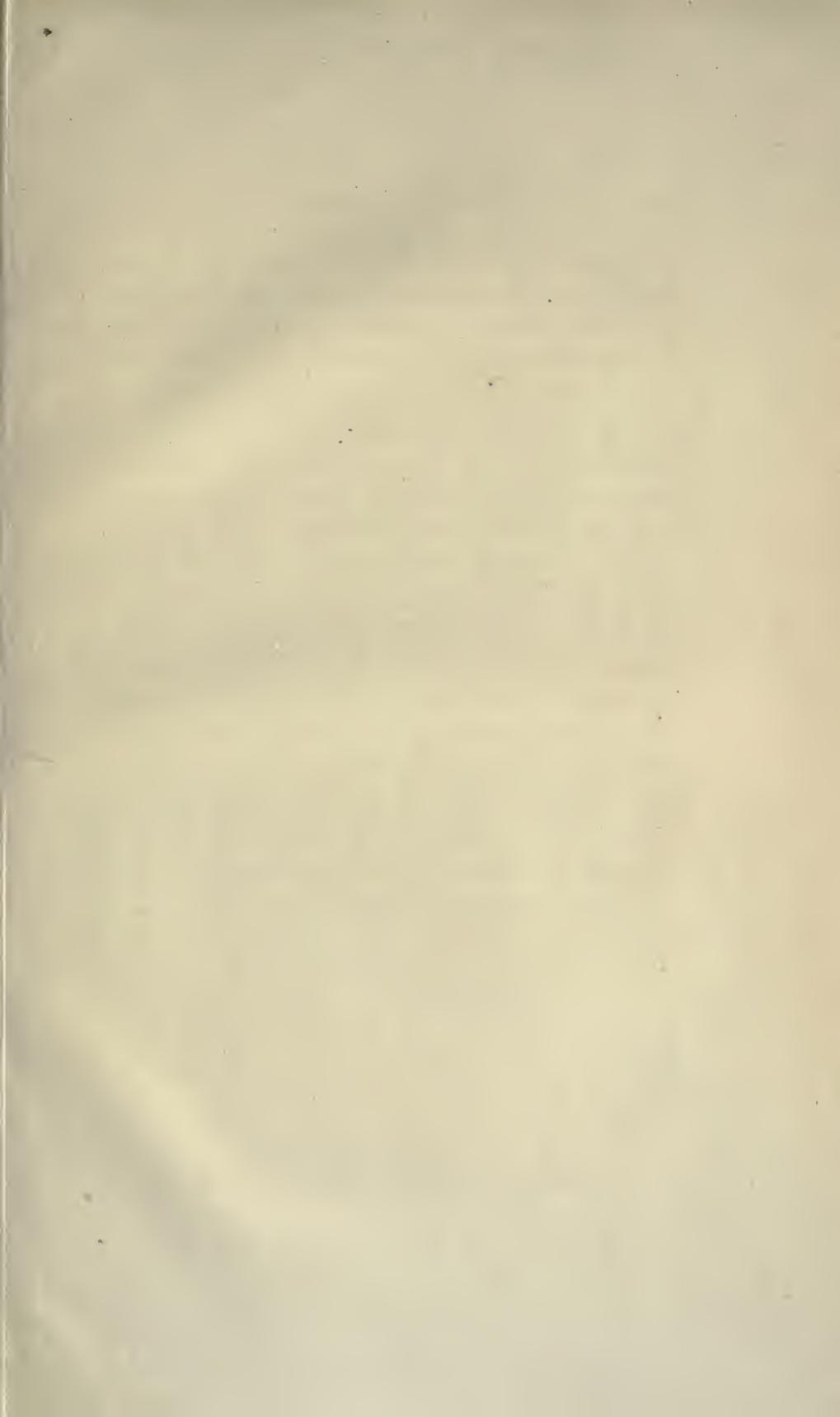
As I have already said, the subject of Acupressure is so fully expounded, illustrated, and enforced by my esteemed colleague, Professor Pirrie, in the earlier part of this volume that I deem it needless to multiply cases any farther, and rest content with quoting twelve out of about forty cases. In these I give examples of the varied modes of acupressure. All have been alike successful, as each was selected as the method best suiting the circumstances at the moment. In not one instance have I had haemorrhage at or after the operation; the removal of the pin, or needle, or wire loop has never in any one case occasioned haemorrhage. A drop or two of blood may have come in a few instances from an abraded granulation; but that is all I have ever seen. The period, on the average, which I think sufficient for the acupressure to continue is forty-eight

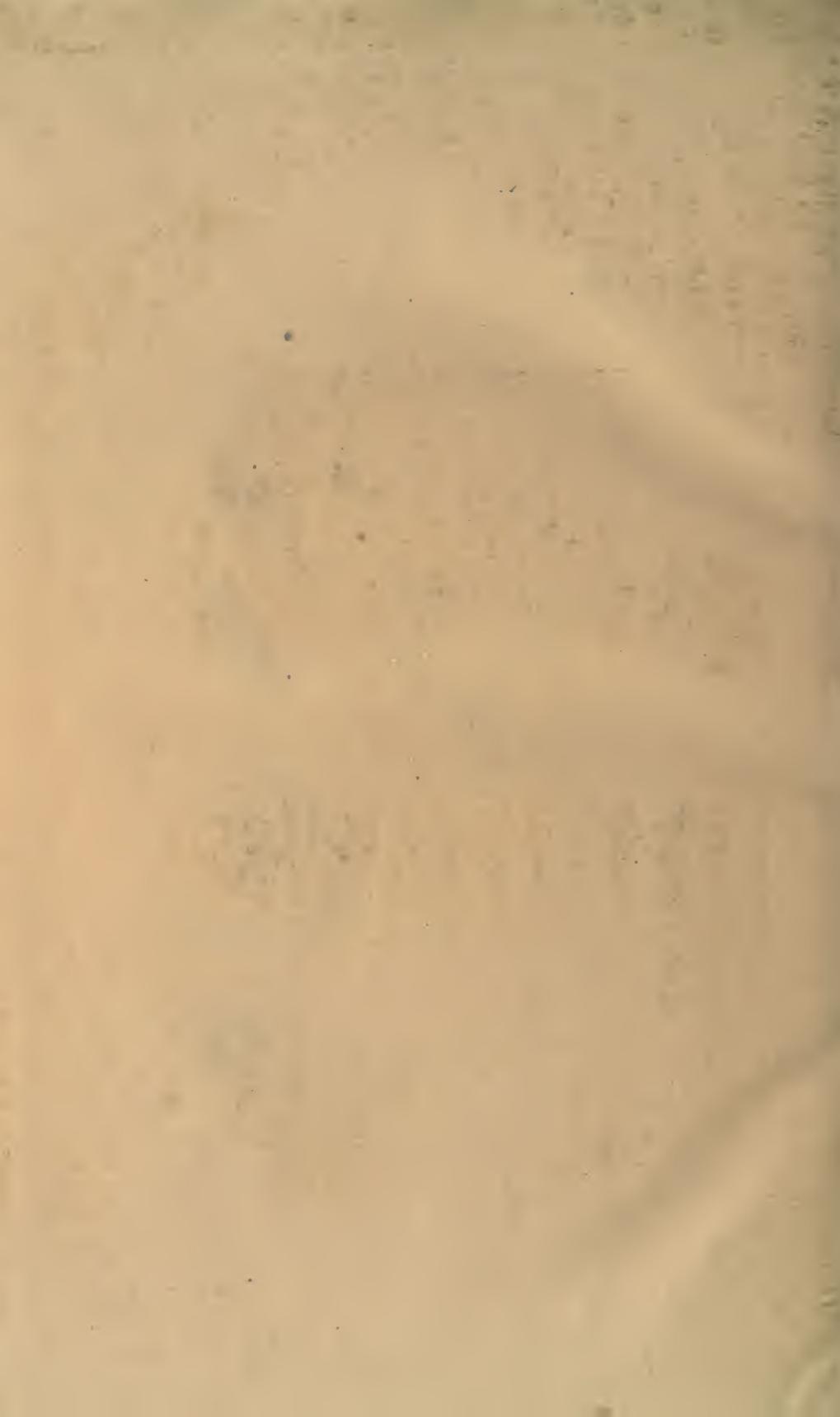
hours, though I feel certain a shorter period would suffice ; yet, as the patient must remain in bed, and as the presence of the pin or wire excites neither pain or irritation, there ought to be no impatience about their removal.

The confidence of the Aberdeen Surgeons is now so firmly established in acupressure that its use is the rule by the Hospital Staff. The operations for this week took place on Wednesday. Amputation at the ankle-joint, and a Chopart's operation, both by Professor Pirrie. In the former, three vessels secured by the Fourth method, and in the latter four vessels by the Aberdeen twist, or Fifth method ; and, further, the excision of a medullary tumour from deep in the ham by myself, in which three vessels were secured by the Fifth method, and one by the Fourth. To-day, Friday the 23d November, the whole of the needles were withdrawn, and not a single drop of blood followed. Can anything but prejudice oppose a trial when such present and prospective advantages are proven to accrue ?

It occurs to the writer to suggest that in persistent haemorrhage from any vein on the face of a stump, arrest may be safely accomplished by having recourse to either the First method or the Fifth, as locality may indicate. A few hours' pressure would ensure permanent occlusion, and then without disturbance the pin be withdrawn.

It may be useful for Surgeons to know that suitable pins, needles, and purest pliant copper wire, all gold electro-plated, are manufactured largely, and will be supplied reasonably by Messrs R. Turner & Co., Old Factory, Redditch, Birmingham, as also a most efficient steel needle for stitching wounds up with wire, straight, and of greater length than usual, so that they afford a hand hold while being used. The Drs. Burton of the Cottage Hospital, Walsall, have aided much in improving the acupressure pins and needles, and have again laid a great obligation on their brethren in the profession of every branch by having planned a Field Surgical Case of Instruments in connection with acupressure so portable that it will carry in a cartouche box or a coat pocket. Mr. James Coxeter the eminent surgical-instrument-maker, 23 and 24, Grafton Street, E., London, has carried out the idea cheaply and well. The case would specially suit volunteer surgeons, and provincial practitioners ; on field service it would be a perfect treasure to the army surgeon.





Author Pirie, William Kirkman, MC M.P.  
Title Acupressure

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